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Rodney L. Joyce
(202) 261-2041
rjoyce@shb.com

November 2, 1998

Magalie Roman Salas, Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

Re: CC Dkt. No. 98-147 (Ex Parte Meeting)

Dear Ms. Salas:

This is to advise you that representatives of Network Access Solutions, Inc. ("NAS") met last Friday afternoon with FCC staff from the Common Carrier Bureau, Office of Plans and Policy and Office of Engineering and Technology to discuss NAS's comments in the above referenced proceeding.

Participants in the meeting from NAS were Jon Aust, Chris Melnick and Roger Poole. NAS's legal counsel (Henry Rivera, Tom Nolan and I) also participated. During the meeting, FCC staff were provided with the enclosed handout.

Sincerely,

Rodney L. Joyce

RLJ:bsb

cc (w/o enc.): Liz Nightingale (Rm. 534-O)
Jason Oxman (Rm. 534-W)
Brent Olson (Rm. 534-I)
Staci Pies (Rm. 538-B)
Jonathan Askin (Rm. 544)
Evan Kwerel (Rm. 822)
Daniel Shiman (Rm. 534-S)
Stagg Newman (Rm. 268, 2000 M St.)
Doug Sicker (Rm. 290G, 2000 M St.)

No. of Copies rec'd 023
List A B C D E

NETWORK ACCESS SOLUTIONS

Advanced Services Rulemaking
Realizing The Potential

October 30, 1998

Discussion Topics

- NAS
- CuNet (Copper Net)
- Bell Atlantic Trials
- Requirements for Success
- Competitive Obstacles
- NAS Recommendations

NAS: Who We Are

- Incorporated 1994

- **Executive Management**
  - Jon Aust, CEO
    - AT&T
  - Chris Melnick, COO
    - MFS / Level 3
  - Scott Yancey,CFO
    - C&W

- **Engineering & Operations**
  - Jim Aust, Director E&O
    - AT&T
  - John Milne, Architect
    - MFS / Level 3
  - Roger Poole, OSS
    - Sprint, UNITEL
  - Henry Rosendale, OPS
    - Bell Atlantic, MFS

CuNet Genesis

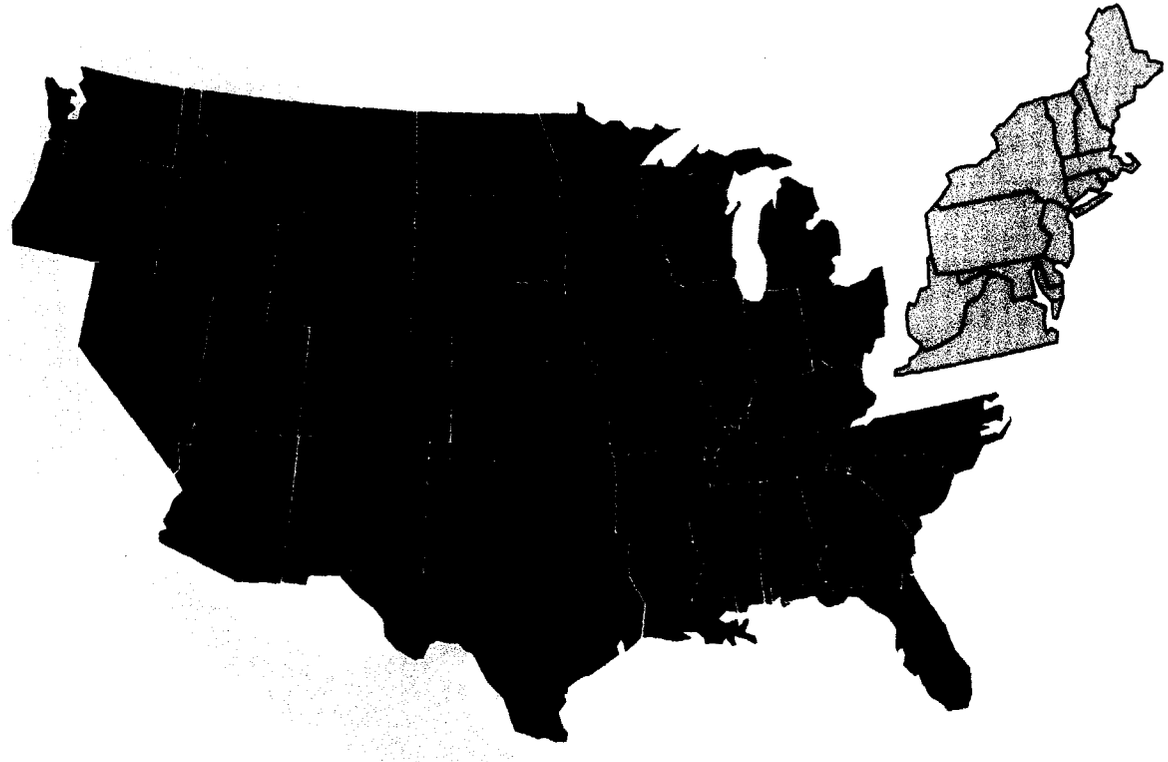
- February 1996 - Telecom Reform Act
  - Competition & New Advanced Services
- NAS Core competencies
  - Management, Engineering & Operations expertise
- DSL Technology
  - Catalyst for lower cost broadband access, applications
- Conclusion
  - NAS can provide a superior class of Broadband services at a lower cost to consumers

CuNet Service Description

- High speed data access service for metropolitan & wide area networks
  - DSL based
    - 128Kb - 7Mb Symmetrical and Asymmetrical
    - Fractional Increments
    - Packet based and Channelized services
  - CuNet provides dedicated connections
    - Internet
    - IXC
    - Corporate LAN

CuNet Territory

- Washington DC
- Philadelphia
- New York
- Boston
- Baltimore
- Pittsburgh
- Richmond
- Wilmington
- Norfolk



NAS NetworkAccessSolutions

CuNet

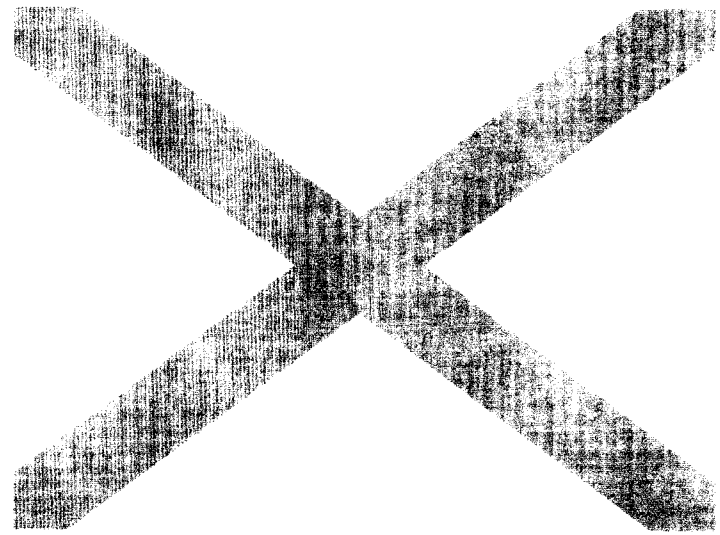
Bell Atlantic

- January 1997 --Interconnection Agreement
  - First interconnect specifically for DSL
  - No DSL based service offering
    - LADS, Alarm Circuits, etc.
- February 1997 -- BFR
  - Establish technically feasible DSL ULL types
    - Spectral compatibility & loop qualification solutions
  - Develop processes for ordering, Provisioning & maintaining of loops
    - Existing Bell Atlantic processes are the baseline
- October 1997 -- Trial
  - Herndon VA Central Office

NAS / Bell Atlantic Trial

- Herndon Central Office
- Define all types of UNE's
  - ULL's -TR Documents completed
    - ADSL, SDSL, HDSL, IDSL & DS1
  - Collocation
  - Transport
- Process development
  - Loop Qualification
  - All other processes are standard BA processes

CuNet Topography & Costs



Requirements for Success

- Collocation
  - Cost & process improvements
    - No paper tigers (NY)
      - Cageless collocation does nothing if costs are not reduced
- ULL
  - Standardize on TR documents
    - BA generated documents
  - Provide loop qualification data per trial
- OSS
  - SLAs
  - Statistics for DSL measurements

Competitive Obstacles

- **Processes not implemented as defined**
  - **DSL ULL's:**
    - BA petition for reconsideration - Ignoring TR's
  - **Loop qualification process:**
    - No implementation
  - **Collocation Process**
    - Time (60 days virtual - 120-180 days physical)
    - Cost (10x10 cage $700 per square foot average)
  - **OSS related processes**
    - No SLA's
    - No Statistics

NAS Position

- The Act works if parties adhere to the guidelines
- BA petitions relative to DSL are disingenuous
  - Issues become clouded by technical obfuscation
  - Tariff filings prove intent to cross subsidize
- NAS will continue to participate in the process
  - State level (NY, PA)
  - FCC
- FCC should control the regulatory process
  - Standardization of UNE's

Proposed Solutions

- Separate Subsidiaries
  - Prevents cross subsidization of RBOC offerings
  - Reduces regulatory intervention
  - Increases competition
  - Solves most of the operational issues
  - Solves the cost issues
- If RBOCS operate in the same competitive environment as other DSL providers, quality and quantity of services will increase and consumers will benefit

Recommendations

- The Telecom Reform Act can work
  - NAS is comprised of experienced networking professionals intent on providing advanced services at reduced costs
- NAS has worked diligently and in good faith with Bell Atlantic for two years
  - It appears Bell Atlantic is not interested in competition or advanced services which compete with existing revenue streams
- Separate subsidiaries are the most logical solution

COLLOCATION STATUS

STATE	CO (CLLI)	ADDRESS	PHYSICAL/ VIRTUAL	APP DATE	DUE DATE	RESP DATE	BUILD FEE	DEP.	DEP. DATE	DUE DATE	PRIORITY
DC	WASHDCDN	730 12th St	P	7/20/98	8/19/98				7/4/98	11/1/98	1
DC	WASHDCGT	1045 Wisconsin Ave NW	P	7/20/98	8/19/98		$96,000.00			4/29/00	3
DC	WASHDCMO	1200 H St. NW	P	7/20/98	8/19/98		$61,804.00			4/29/00	1
DC	WASHDCMT	2055 L St.	P	7/20/98	8/19/98	6/23/98	$132,664.00		7/4/98	11/1/98	1
DC	WASHDCSW	30 E St. NW	P	revision	#VALUE!					4/29/00	1
DC	WASHDCWL	4268 Wisconsin Ave NW	P	7/20/98	8/19/98					4/29/00	2
MD	BLTMMDCH	323 North Charles St, Baltimore	P	8/17/98	9/16/98		$27,415.00			4/29/00	3
MD	BTHSMDBD	7887 Bradley Blvd, Bethesda	P	8/17/98	9/16/98					4/29/00	3
MD	BTVLMDBV	11600 Montgomery Rd, Beltsville	P	7/20/98	8/19/98		$60,685.50			4/29/00	3
MD	CHCHMDBE	4533 Stanford St, Chevy Chase	P	8/12/98	9/11/98		$18,872.00			4/29/00	3
MD	CLPKMDBW	6315 Greenbelt Rd, Greenbelt	P	7/6/98	8/5/98		$31,802.00			4/29/00	1
MD	GTBGMDGB	5 N Fredericks Rd, Gaithersburg	P	7/9/98	8/8/98		$61,897.00			4/29/00	1
MD	LARLMDLR	309 Carroll Ave, Laurel	P	7/20/98	8/19/98		$77,702.00			4/29/00	3
MD	RKVLMDRV	490 Fleet Street	P	7/9/98	8/8/98		$28,814.00			4/29/00	2
MD	RKVLMDMR	6015 Montrosse Rd, Rockville	P	7/9/98	8/8/98					4/29/00	2
MD	SLSPMDSS	8670 Georgia Ave, Silver Spring	P	7/20/98	8/19/98		$12,608.00			4/29/00	1
PA	ARMRPAAR	116 E Lancaster Ave, Ardmore	P	8/17/98	9/16/98					4/29/00	2
PA	BCYNPABC	321 Levering Mill Rd, Bala-Cynwyd	P	8/17/98	9/16/98					4/29/00	2
PA	BRYMPABM	1102 E Lancaster Ave, Bryn Mawr	P	8/17/98	9/16/98					4/29/00	3
PA	KGPRPAKP	540 Allendale Rd, King of Prussia	V	rsbmt-vir						2/29/00	1
PA	PAOLPAPA	125 W Circular Ave, Paoli	P	8/17/98	9/16/98					4/29/00	3
PA	PHLAPALO	1631 Arch St, Phili	P	8/17/98	9/16/98					4/29/00	1
PA	PHLAPAMK	900 Race St, Phili	P	8/17/98	9/16/98					4/29/00	1
PA	WAYNPAWY	300 W Lancaster Ave, Wayne	V	8/17/98	9/16/98					2/29/00	2
VA	ALXNVAAX	1316 Mt Vernon Ave, Alexandria	P	7/20/98	8/19/98					4/29/00	3
VA	ARTNVAAR	1025 N Irving St, Arlington	P	6/4/98	11/5/98		$95,000.00			4/29/00	1
VA	FLCHVAMF	2935 Gallows Rd, Falls Church	P	7/20/98	8/19/98					4/29/00	2
VA	FRFXVAFF	10431 Lee Hwy, Fairfax	P	7/20/98	8/19/98		$49,300.00			4/29/00	2
VA	GRFLVAGF	755 Walker Rd, Great Falls	V	8/6/98	11/5/98					2/29/00	3
VA	HRNDVAHE	472 Elden St, Herndon	V	7/28/98	8/27/98					2/29/00	2
VA	MCLNVALV	1701 Chain Bridge Rd, McLean	V	7/28/98	8/27/98					2/29/00	1
VA	RCMDVAGR	703 E Grace St, Richmond	P	8/17/98	9/16/98		$60,718.40			4/29/00	1
VA	RCMDVAHL	3310 Hull St, Richmond	P	8/17/98	9/16/98		$63,920.00			4/29/00	2

COLLOCATION STATUS

STATE	CO (CLLI)	ADDRESS	PHYSICAL/ VIRTUAL	APP DATE	DUE DATE	RESP DATE	BUILD FEE	DEP.	DEP. DATE	DUE DATE	PRIORITY
VA	RCMDVAHR	6102 Hermitage Rd, Richmond	P	8/17/98	9/16/98					4/29/00	2
VA	RCMDVAPE	3500 Pemberton Rd, Richmond	P	8/17/98	9/16/98		$45,038.50			4/29/00	2
VA	RCMDVASR	2617 Stuart Ave, Richmond	P	8/17/98	9/16/98		$39,362.50			4/29/00	1
VA	RSTNVAFM	Fox Mill Rd, Reston	V	7/20/98	8/19/98					2/29/00	1
VA	RSTNVALF	1760 Business Ctr Dr, Reston	P	7/6/98	8/5/98					4/29/00	2
VA	VINNVAVA	2702 Sutton Rd, Vienna	P	7/6/98	8/5/98					4/29/00	2
NY	NYCMNYWS	140 West Street	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNYBS	104 Broad Street	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNY37	221 E 37 ST	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNY56	228 E 56 ST	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNY36	230 W 36 ST	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNY79	208 E 79 ST	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNYVS	50 Varick ST	P	9/2/98	10/2/98					4/29/00	
NY	NYCMNY50	435 W 50 ST	P	9/2/98	10/2/98					4/29/00	
					1/30/00					2/29/00	
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					1/30/00		$963,602.90			2/29/00	

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LONDON
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BUENOS AIRES

October 19, 1998

By Telecopy and First Class Mail

Lawrence G. Malone, Esq.
General Counsel
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350

Re: Case No. 97-C-0271

Dear Mr. Malone:

I write this letter on behalf of Network Access Solutions, Inc. ("NAS") in response to Bell Atlantic-NY's attempt, in its October 13, 1998 affidavit, to create the false impression that it is complying fully with all applicable requirements in provisioning collocation arrangements. NAS plans shortly to initiate DSL service in several Bell Atlantic jurisdictions, including New York. In order to provide DSL service, NAS requires the ability to collocate its DSL equipment in Bell Atlantic wire centers. Within the last three months, the company has applied for collocation arrangements in more than 60 Bell Atlantic wire centers, including several wire centers in New York.

Although Section 5.1.3(B) of Bell Atlantic-NY's Tariff P.S.C. No. 914 requires that the company provide NAS "with a detailed breakdown of the work required" when room construction is necessary in order to provision a collocation arrangement, Bell Atlantic has refused to do so. Instead, its policy in all jurisdictions is to provide NAS with a one sentence invoice stating the total room construction amount without providing any breakdown whatsoever. The room construction charge that Bell Atlantic demands averages almost $60,000 per wire center.

Not only does Bell Atlantic violate the law by failing to include on invoices a breakdown of work required for each collocation arrangement requiring room construction, it also violates the law by insisting on these invoices that NAS pay 50 percent of the charges for room construction and other non-recurring costs within 30 days of the invoice date. The FCC has held that the Bell Atlantic LECs must permit carriers having less than $2 billion in annual telecommunications revenue to pay

these costs over an 18-month period rather than a 30-day period.[1] NAS's annual telecommunications revenues are less than $2 billion.

Seven week ago, NAS wrote a letter to Bell Atlantic bringing both of these violations to the company's attention. In that letter, NAS asked that Bell Atlantic comply with its obligation to provide NAS with a breakdown of the room construction work that is required in connection with each collocation application that NAS submits. The letter also expressed NAS's possible interest in taking advantage of the 18-month installment payment option, and it requested that Bell Atlantic provide it with certain additional information about this option. A copy of that letter is enclosed for the Commission's convenience. NAS reiterated its request for the information requested in this letter in several telephone calls and e-mail messages to Bell Atlantic.

Unfortunately, Bell Atlantic has not supplied a cost breakdown of room construction charges for even one of the numerous wire centers in which NAS has applied to collocate, and it has failed to give NAS any information on the installment payment option. Instead, the company continues to send one-line invoices in response to NAS's collocation applications that do not itemize room construction costs and that demand payment of 50 percent of the total amount within 30 days.

The Commission should immediately order Bell Atlantic-New York to comply with its collocation obligations.

For your convenience, I am enclosing the original and 25 copies of this letter for filing in the above proceeding. Please date stamp the extra copy and return it to me in the enclosed stamped envelope.

Respectfully submitted,

Rodney L. Joyce
Counsel for Network Access Solutions, Inc.

Enclosure

cc: All Parties
Debra Renner, Acting Secretary (by U.S. mail)
Andrew Kline, Esq. (by telecopy)
Peter M. McGowan, Esq. (by telecopy)

1. NYNEX and Bell Atlantic, 12 FCC Rcd. 19985, 20110 (1997).

NETWORKACCESSSOLUTIONS

September 3, 1998

Frank Joy
Senior Project Manager-Collocation
Bell Atlantic
Telecom Industry Services
375 Pearl Street RM 2101
New York, NY 10038

Dear Frank:

I write this letter in order to discuss to important matters that are relevant to NAS's applications for physical collocation in Bell Atlantic states. Each matter is discussed below.

First, please provide me with a copy of the Bell Atlantic policy that defines the terms under which the company will accept payment of non-recurring costs associated with collocation on an installment basis in each of the following jurisdictions: Virginia, District of Colombia, Maryland, Pennsylvania, Delaware, New Jersey, New York, and Massachusetts. As you know, the FCC has required that Bell Atlantic permit collocating carriers with less than $2 billion per year in telecommunications revenue to pay non-recurring collocation costs over an 18-month period.[1] NAS has less than $2 billion per year in telecommunications revenue, and it is potentially interest in taking advantage of the installment payment plan. Please provide me with a copy of Bell Atlantic's installment payment policy for each of the jurisdictions referred to above by no later than Tuesday, September 8, 1998 so that NAS may determine whether it would benefit by using the installment option in connection with its collocation applications, including the numerous applications it has filed within the past few weeks.

Second, I write in order to respond to Bell Atlantic's letter dated August 26, 1998, stating that NAS must pay estimated room construction costs of $139,750 in order to physically collocate its equipment in the Alexandria, VA central office. For your convenience, a copy of that letter is enclosed.

[1] See NYNEX and Bell Atlantic, 12 FCC Rcd. 19985, 20110 (1997)

100 Carpenter Dr., Suite 206 Sterling, VA 20164
703.742.7700 703.742.7706 (fax)
www.nas-corp.com

Before NAS can accept this estimated charge, it requires the following documentation form Bell Atlantic:

1. the design plans for room construction in the Alexandria central office;

2. estimated labor costs for each category of construction required by the design plans; and

3. estimated material costs for each category of construction required by these design plans.

In addition, please let us know the number of contractor bids that Bell Atlantic obtained for performing the subject room construction.

Not only does NAS request the above documentation for room construction charges in the Alexandria central office, we also request that Bell Atlantic provide us with such documentation for each application by NAS for physical collocation in a Bell Atlantic central office in any state. NAS is seeking to physically collocate its facilities in a large number of Bell Atlantic central offices in several states. It needs this documentation in order to ensure that its financial resources are used efficiently.

As you know, NAS has a right to obtain this documentation under the FCC's collocation policies. See, e.g., Local Competition Order, 11 FCC Rcd. 15779-807, (1996); Expanded Interconnection Order, 7 FCC Rcd. 7369, 7441-47 (1992). NAS also has a right to obtain this documentation under Bell Atlantic's tariff since the tariff requires that Bell Atlantic provide NAS with a breakdown of "the rates for construction work . . . and any vendor (S) charges for materials", and it gives NAS a right to "review [room construction] design." See Bell Atlantic Tariff FCC No. 1 § 19.3.1 (A) and (F).

I ask that you provide us with the requested documentation within 15 days of the date of this letter with respect to the Alexandria collocation applications as well as all other collocation applications that NAS already has submitted. With respect to each future collocation applications, I ask that you provide us with the requested documentation on the same date that you provide us with the total estimated room construction cost applicable to that application.

Sincerely,

Jonathan P. Aust
CEO

JPA/ma

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 8, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P980-321 for the Georgetown (WASHDCGT) central office in Washington D.C.

There is space available for the requested 100 square feet. The contractor's estimated bid for room construction is $96,000.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit a 50% payment of the estimated cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of $96,000.00. As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
William Campbell - Bell Atlantic
ms/nasdcgt

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

June 23, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

WASHDC-RO

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9805-35 for the Metro central office in Washington, DC.

There is room currently available to accommodate the request for 100 square feet. The pro rata cost for occupancy is $61,084.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the pro rata cost of room construction.

Bell Atlantic is prepared to proceed with this application upon receipt of payment in the amount of $61,084.00.

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

June 23, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

WASHDCHT

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9805-33 for the Midtown central office in Washinton, DC.

There is space available for the requested 100 square feet. The estimated contractor's bid for room construction is $132,664.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit a 50% payment of the estimated cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of $66,332.00.

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 8, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, **P9807-315** for the **Beltsville (BTVLMDBV)** central office in **Maryland.**

There is space available for the requested **100 square feet.** The contractor's estimated pro rata bid for room construction is **$60,685.50.** This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the estimated pro rata cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of **$60,685.50.** As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
Saundra Leonard - Bell Atlantic
ms/nasmdbv

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 8, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9807-178 for the Berwyn Center (CLPKMDBW) central office in Maryland.

There is space available for the requested 100 square feet. The contractor's estimated pro rata bid for room construction is $31,802.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the estimated pro rata cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of $31,802.00. As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
Saundra Leonard - Bell Atlantic
ms/nasmdbw

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 8, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, **P9807-176** for the **Gaithersburg (GTBGMDGB)** central office in **Maryland.**

There is space available for the requested **100 square feet.** The contractor's estimated pro rata bid for room construction is **$6,897.25.** This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the estimated pro rata cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of **$6,897.25.** As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
William Campbell - Bell Atlantic
ms/nasmdgb

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 8, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9807-313 for the Laurel (LARLMDLR) central office in Maryland.

There is space available for the requested 100 square feet. The contractor's estimated pro rata bid for room construction is $77,702.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the estimated pro rata cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of $77,702.00. As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
Saundra Leonard - Bell Atlantic
ms/nasmdlr

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 8, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9808-129 for the Rockville (RKVLMDRV) central office in Maryland.

There is space available for the requested 100 square feet. The contractor's estimated pro rata bid for room construction is $24,814.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the estimated pro rata cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of $24,814.00. As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
Saundra Leonard - Bell Atlantic
ms/nasmdrv

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 21[illegible]
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

September 1, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

SLSPMDSS

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9807-318 for the Silver Springs central office in Maryland.

There is space available for the requested 100 square feet. The contractor's estimated pro rata bid for room construction is $12,608.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit the estimated pro rata cost of room construction.

Bell Atlantic is prepared to commence room construction upon receipt of payment in the amount of $12,608.00. As per Tariff F.C.C. No. 1, Section 19.3.1 (C), "If the Telephone Company does not receive the first installment of the estimated construction charges within the 30-day period, the Telephone Company will consider the offer rejected and has the right to make the available space allocated for that application available to meet additional Collocator requests."

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic
William Campbell - Bell Atlantic
ms/nasmdss

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

June 23, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

VIA FAX

Dear Jerry:

This letter is to inform you of the estimated costs Network Access Solutions will incur for room construction associated with the physical collocation application, P9805-32 for the Arlington central office in Virginia. ARTNVAAQ

There is room currently available to accommodate the request for 100 square feet. The estimated contractor's bid for room construction is $95,000.00. This cost is in addition to the tariffed rates for cage construction, overhead lighting, cable installation and AC power as identified in FCC No. 1, Section 19.

Please note that the tariff, which gives Bell Atlantic permission to go forward with site implementation, allows Network Access Solutions thirty (30) days to submit a 50% payment of the estimated cost of room construction.

Bell Atlantic is prepared to proceed with the Network Access Solutions application upon receipt of payment in the amount of $47,500.00.

Please contact me at (212) 429-6212, if you have any questions.

Sincerely,

Frank Joy
Senior Project Manager- Collocation

cc: Bruce Lear – Bell Atlantic
Wayne Madden - Bell Atlantic

Bell Atlantic
Telecom Industry Services
375 Pearl Street Rm. 2101
New York, NY 10038
212-429-6212

Frank Joy
Senior Project Manager- Collocation

June 23, 1998

Jerry Hancock
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, VA 20164

Re: Application for Physical Collocation

Dear Jerry:

__X__ We Have received your application(s) for Physical Collocation at the following Bell Atlantic Central Office(s):

Control #	CLLI	C.O. Location
P9805-34	RSTNVAFM	FOX MILL RD, RESTON, VA

___ A site survey has been completed for the following locations and the Due Dates are scheduled as follows:

___ Due to the continued recent significant demand for space in these offices, we are still in the process of evaluating our ability to meet your request. We will provide an updated status for these offices within ten (10) business days:

__X__ Unfortunately, we are unable to process the following application(s) for the reason(s) indicated below:

__X__ No Physical Collocation space available at this office: (Virtual Collocation is immediately available. If you are interested in pursuing this, please submit a Virtual Collocation application, or call if you require assistance.)

Control #	CLLI	C.O. Location
P9805-34	RSTNVAFM	FOX MILL RD, RESTON, VA

NOTE: Bell Atlantic is in the process of filing for an exemption for this office.

Bell Atlantic

VIRTUAL COLLOCATION APPLICATION

DATE SENT 08 / 27 / 98 REVISION # _____

I. CUSTOMER INFORMATION

1. **Company** Network Access Solutions
   Street 100 Carpenter Drive Suite 206
   City Sterling State VA ZIP 20164
2. **24 Hour Emergency Contact #** Henry Rosendale 1-888-703-8662
3. Contact Name Henry Rosendale
   Telephone Number 703-742-7700 Facsimile Number 703-742-7706
4. **Desired Service Date** 09 / 28 / 98
5. **Activity:** New _____ Rearrangement/augment: _____ Other: _____
6. **Percent Interstate Usage (PIU)** 100
7. **Central Office CLLI Code** KGPRPAKP
   Street Address 540 Allentown Road City King of Prussia, PA
8. **ACNA** NAO **AECN** _____ **Applicable Tariff (FCC, NY 914, etc.)** _____

II. TYPE OF SERVICE

Initial Terminations Digital: DS3 5 DS1 20 DS0 _____ STS-1 _____
Voice Grade: LOOPS 1000

Incremental Quantities of Desired Services:

Interface (Cross-Connect) Forecast

	Year 1	Year 2	Year 3
DS3	5	5	5
DS1	20	20	20
DS0			
LOOPS	1500	1500	1500
STS-1			
OCN			

Service (Channel Termination) Forecast

	Year 1	Year 2	Year 3
DS3	5	5	5
DS1	20	20	20
DS0			
LOOPS	1500	1500	1500
STS-1			
OCN			

III. EQUIPMENT REQUIREMENTS

3. **List of Collocator's designated Equipment**
(NOTE: Please specify type, heat dissipation, size, quantity and CLEI (Bellcore Common Language Equipment Identifier)for the master shelf/arm for each item to be installed. Also, please attach a block diagram/schematic of the equipment layout, an outline specification which includes a wiring list, equipment list and front equipment drawing as well as a copy of the product's technical description and certification of NEB's compliance. This information is **REQUIRED)**

	Manufacturer/Model #	Heat Dissipation	Dimensions	Qty	CLEI
A	Ascend Max TNT	3410 btu hr	14x17.4x11	2	
B	Ascend-STBx9000	3410 btu hr	19x31x15	1	
C					
D					
E					
F					

Will Bell Atlantic be designated to install the equipment ? Yes _____ No No

(NOTE: Bell Atlantic must be designated to install all equipment in MA, ME, NH, RI and VT)

If no, provide the Bell Atlantic approved Installation Vendor Name: P-COM Network Svc

Vendor Contact Number: 703-917-4304

2 **List of required plug-in units**

NOTE: Please indicate the circuit number or slot assignment where each plug-in is to be installed.

		Quantity	
Manufacturer/Model #	Slot/Circuit #	In-Service	Protection

No

3. **Is synchronization/timing required?** Yes _____ No _____

Type of timing/synchronization: _____

4. Spare Plug-in Units

Manufacturer/Model #	CLEI	Quantity

Bell Atlantic

VIRTUAL COLLOCATION APPLICATION

DATE SENT 08 / 27 / 98 REVISION # _____

I. CUSTOMER INFORMATION

1. **Company** Network Access Solutions
   Street 100 Carpenter Drive Suite 206
   City Sterling State VA ZIP 20164
2. **24 Hour Emergency Contact #** Henry Rosendale 1-888-703-8662
3. Contact Name Henry Rosendale
   Telephone Number 703-742-7700 Facsimile Number 703-742-7706
4. **Desired Service Date** 09 / 28 / 98
5. **Activity:** New _____ Rearrangement/augment: _____ Other: _____
6. **Percent Interstate Usage (PIU)** New
7. **Central Office CLLI Code** 100
   Street Address 300 W Lancaster Ave City WAYNPAWY
8. **ACNA** NAO **AECN** _____ **Applicable Tariff (FCC, NY 914, etc.)** _____

II. TYPE OF SERVICE

Initial Terminations Digital: DS3 5 DS1 20 DS0 _____ STS-1 _____
Voice Grade: LOOPS 1000

Incremental Quantities of Desired Services:

Interface (Cross-Connect) Forecast

	Year 1	Year 2	Year 3
DS3	5	5	5
DS1	20	20	20
DS0			
LOOPS	1500	1500	1500
STS-1			
OCN			

Service (Channel Termination) Forecast

	Year 1	Year 2	Year 3
DS3	5	5	5
DS1	20	20	20
DS0			
LOOPS	1500	1500	1500
STS-1			
OCN			

III. EQUIPMENT REQUIREMENTS

3. **List of Collocator's designated Equipment**
(NOTE: Please specify type, heat dissipation, size, quantity and CLEI (Bellcore Common Language Equipment Identifier)for the master shelf/arm for each item to be installed. Also, please attach a block diagram/schematic of the equipment layout, an outline specification which includes a wiring list, equipment list and front equipment drawing as well as a copy of the product's technical description and certification of NEB's compliance. This information is **REQUIRED**)

	Manufacturer/Model #	Heat Dissipation	Dimensions	Qty	CLEI
A	Ascend Max TNT	3410 btu hr	14x17.4x11	2	
B	AscendB-STBx9000	3410 btu hr	19x31x15	1	
C					
D					
E					
F					

Will Bell Atlantic be designated to install the equipment ? Yes _____ No x

(NOTE: Bell Atlantic must be designated to install all equipment in MA, ME, NH, RI and VT)

If no, provide the Bell Atlantic approved Installation Vendor Name: P-Com Network SVC

Vendor Contact Number: 703-917-4304

2 **List of required plug-in units**

NOTE: Please indicate the circuit number or slot assignment where each plug-in is to be installed.

Manufacturer/Model #	Slot/Circuit #	Quantity In-Service	Quantity Protection
		x	

3. **Is synchronization/timing required?** Yes _____ No _____

Type of timing/synchronization: _____

4. **Spare Plug-in Units**

Bell Atlantic

VIRTUAL COLLOCATION APPLICATION

DATE SENT 08 / 31 / 98 REVISION # _____

I. CUSTOMER INFORMATION

1. **Company** Network Access Solutions
   Street 100 Carpenter Drive Suite 206
   City Sterling State VA ZIP 20164
2. **24 Hour Emergency Contact #** Henry Rosendale
3. Contact Name Henry Rosendale
   Telephone Number 703-742-7700 Facsimile Number 703-742-7706
4. **Desired Service Date** 09 / 30 / 98
5. **Activity:** New New _____ Rearrangement/augment: _____ Other: _____
6. **Percent Interstate Usage (PIU)** 100
7. **Central Office CLLI Code** GRFLVAGF
   Street Address 755 Walker Rd City Great Falls, VA
8. **ACNA** NAO **AECN** _____ **Applicable Tariff (FCC, NY 914, etc.)** _____

II. TYPE OF SERVICE

Initial Terminations Digital: DS3 5 DS1 20 DS0 _____ STS-1 _____
Voice Grade: LOOPS 1500

Incremental Quantities of Desired Services:

Interface (Cross-Connect) Forecast

	Year 1	Year 2	Year 3
DS3	5	5	5
DS1	20	20	20
DS0			
LOOPS	1500	1500	1500
STS-1			
OCN			

Service (Channel Termination) Forecast

	Year 1	Year 2	Year 3
DS3	5	5	5
DS1	20	20	20
DS0			
LOOPS	1500	1500	1500
STS-1			
OCN			

III. EQUIPMENT REQUIREMENTS

3. **List of Collocator's designated Equipment**
(NOTE: Please specify type, heat dissipation, size, quantity and CLEI (Bellcore Common Language Equipment Identifier)for the master shelf/arm for each item to be installed. Also, please attach a block diagram/schematic of the equipment layout, an outline specification which includes a wiring list, equipment list and front equipment drawing as well as a copy of the product's technical description and certification of NEB's compliance. This information is **REQUIRED**)

	Manufacturer/Model #	Heat Dissipation	Dimensions	Qty	CLEI
A	Ascend Max TNT	3410 btu hr	14x17.4x11	2	
B	Ascend-STBx9000	3410 btu hr	19x31x15	2	
C					
D					
E					
F					

Will Bell Atlantic be designated to install the equipment ? Yes _____ No x

(NOTE: Bell Atlantic must be designated to install all equipment in MA, ME, NH, RI and VT)

If no, provide the Bell Atlantic approved Installation Vendor Name: P-Com Network Svc

Vendor Contact Number: 703-917-4304

2 **List of required plug-in units**

NOTE: Please indicate the circuit number or slot assignment where each plug-in is to be installed.

Manufacturer/Model #	Slot/Circuit #	Quantity In-Service	Quantity Protection

No

3. **Is synchronization/timing required?** Yes _____ No _____

Type of timing/synchronization: _____

4. Spare Plug-in Units

Manufacturer/Model #	CLEI	Quantity

Bell Atlantic
1320 N. Courthouse Road - 2nd Floor
Arlington, VA 22201
703-974-4621

Bruce D. Lear
Product Manager

August 31,1998

Mr. Jim Aust
Network Access Solutions
100 Carpenter Drive, Suite 206
Sterling, Virginia 20164

VIA FAX

Dear Jim:

This letter is in response to your August 19 physical application for collocation at the Great Falls central office.

Central Office Name	Central Office CLLI	BA Tracking #	Physical Space
Great Falls	GRFLVAGF	P9808-116	N (Virtual Only)

This office is currently not listed in Bell Atlantic's tariffs and Bell Atlantic is treating this application as a Bona Fide Request. There is insufficient space at this location to accommodate physical collocation; however, NAS may submit a virtual collocation application for this central office.

Sincerely,

/s/ Bruce D. Lear

cc: Frank Joy, Bell Atlantic
Wayne Madden, Bell Atlantic
William Campbell, Bell Atlantic

Post-it® Fax Note 7671	Date 8/31/98	# of pages ▶ 1
To MR JIM AUST	From BRUCE LEAR	
Co./Dept. N.A.S	Co. BELL ATLANTIC	
Phone # 703-742-7700	Phone # 703-974-4621	
Fax # 703-742-7706	Fax # 703-974-2197	

Bell Atlantic
1320 N. Courthouse Road - 2nd Floor
Arlington, VA 22201
703-974-4621

Bruce D. Lear
Product Manager

August 15, 1998

Mr. Scott Yancey
CFO
Network Access Solutions
100 Carpenter Drive
Sterling, Virginia 20164

VIA INTERNET

Dear Scott, :

This letter is in response to your July 24, 1998 bona fide request for physical collocation space at the following central offices:

Central Office Name	Central Office CLLI	BA Tracking #	Physical Space
Lake Fairfax	RSTNVALF	P9807-317	N (Virtual Only)
Vienna	VINNVAVN	P9807-318	Y
Merrifield	FLCHVAMF	I9807-317	Y

There is currently space available to accommodate physical collocation at the Merrifield and Vienna central offices. Bell Atlantic will proceed with preparation of the estimated room construction costs for these two location. Your request for physical collocation space at the Merrifield central office follows previous requests. Bell Atlantic will advise NAS if there is a problem accommodating the space requirements requested by NAS upon completion of the architects drawings for the collocation room.

NAS may submit a virtual collocation application for the Lake Fairfax central office.

Wayne Madden is the Senior Project Manager assigned to NAS and will assist your team with the implementation of your collocation arrangements.

Sincerely,

/s/ Bruce D. Lear

cc: Frank Joy, Bell Atlantic
Wayne Madden, Bell Atlantic

Bell Atlantic

TR 72575
Issue 2, November 1997

Bell Atlantic Technical Reference

DRAFT 3

Digital Unbundled Loop Services Technical Specifications

DRAFT 3

Notice

This Technical Reference is published by Bell Atlantic to provide a technical description of Digital Unbundled Loop Services. To the extent feasible, the description references or duplicates existing published technical references utilized by the industry.

Bell Atlantic reserves the right to revise this technical reference for any reason including, but not limited to, changes in tariffs, laws, or regulations, conformity with updates and changes in standards promulgated by various agencies, utilization of advances in the state of technical arts, or the reflection of changes in the design of any facilities, equipment, techniques, or procedures described or referred to herein. Liability for difficulties arising from technical limitations or changes herein is disclaimed.

Bell Atlantic reserves the right not to offer any or all of these services and to withdraw any or all of them at any future time. In addition, the services described herein are based on available facilities and equipment and may not be universally available.

With respect to services offered pursuant to tariff, however, the terms and conditions of the service offering are determined by the tariff itself and applicable laws and regulations. This reference is intended to be supplemental to the tariffs. In the event of a conflict between the tariffs, laws or regulations and this reference, the tariffs, laws, and regulations shall govern.

For additional copies, please contact:

Bell Atlantic Document and Information Delivery Services
1310 N. Court House Road
Arlington, VA 22201
703-974- 5887

For information about the technical specifications in this TR, contact:

Trone Bishop
2E13
1 East Pratt Street
Baltimore, MD 21202
410-736-7622

TR 72575, Issue 2, November 1997
DRAFT 3
Bell Atlantic Technical Reference

Digital Unbundled Loop Services Technical Specifications

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1. General

1.01 This technical reference provides the technical specifications associated with the Digital Unbundled Loop Services offered by Bell Atlantic (BA) in the co-carrier section of some local exchange tariffs or via contract. All of the services described in this document may not be available in every jurisdiction.

1.02 This technical reference has been reissued to provide:

- A Power Spectral Density (PSD) mask for the ISDN Basic Rate unbundled loop service;
- The specifications associated with Digital Data Service (DDS), High Bit Rate Digital Subscriber Line (HDSL), and Asymmetrical Digital Subscriber Line (ADSL) unbundled loop services; and,
- DS1 pattern sensitivity test criteria that conforms with American National Standards.

1.03 Digital unbundled loop services enable Other Telephone Companies (OTC) that are collocated in a BA Central Office to connect to BA subscriber loops that are designed to support digital services including Integrated Services Digital Network (ISDN) services.

1.04 The following digital unbundled loop services are defined: ISDN Basic Rate, DS1, DDS, HDSL, and ADSL.

1.05 The technical specifications in this document assume that the OTC is collocated in the same CO as the digital unbundled loop service. In the future, BA may offer transport services for digital unbundled loop services. In that case, the technical specifications associated with the transport service should be consulted.

2. Service Description

A. General

2.01 The description, terms and conditions, rates, regulations, and Universal Service Order Codes (USOCs) for digital unbundled loop services are contained in applicable tariffs or contracts.

2.02 Digital unbundled loop services are provided subject to availability on a first-come first-served basis. Special construction charges apply when appropriate facilities are not available.

2.03 Digital unbundled loop services provide the OTC with a transmission channel suitable for the transport of certain digital services. The channel is between the Central Office Distributing Frame (CODF) or DSX-1 termination of OTC equipment in a BA Central Office (CO) and the Rate Demarcation Point (RDP) at an End User (EU) customer location.

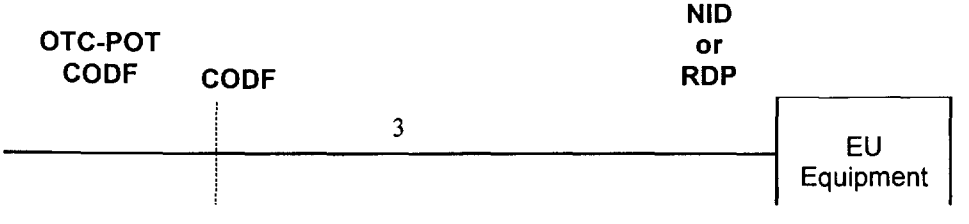
B. ISDN Basic Rate Unbundled Loop Service (IBRULS)

2.04 IBRULS provides the OTC with an effective 2-wire channel that is suitable for the transport of 160 kbps digital signals in both directions simultaneously using the 2B1Q line code described in ANSI T1.601-1992 [1].

2.05 The interface at the OTC CODF termination is 2-wire and the interface at the EU-RDP is 2-wire. If a single circuit NID is provided at the EU-RDP, an RJ11C or an RJ49C connector will be used. At each interface one conductor is called tip and the other conductor is called ring.

2.06 The transmission channel between the IBRULS 2-wire interfaces is effective 2-wire. An effective 2-wire channel may be entirely 2-wire or it may contain a 4-wire facility portion (such as a Digital Loop Carrier) with a 2-wire metallic extension to the EU-RDP. A typical IBRULS configuration is shown in Figure 2-1.

2.07 IBRULS supports full duplex 160 kbps digital transmission. The 160 kbps ISDN Basic Rate supports a 16 kbps overhead channel for performance monitoring, framing, synchronization, and maintenance. In addition, the line rate supports 144 kbps of payload data which is divided into three channels, two 64 kbps "B" (Bearer) channels and one 16 kbps "D" (Data) channel.



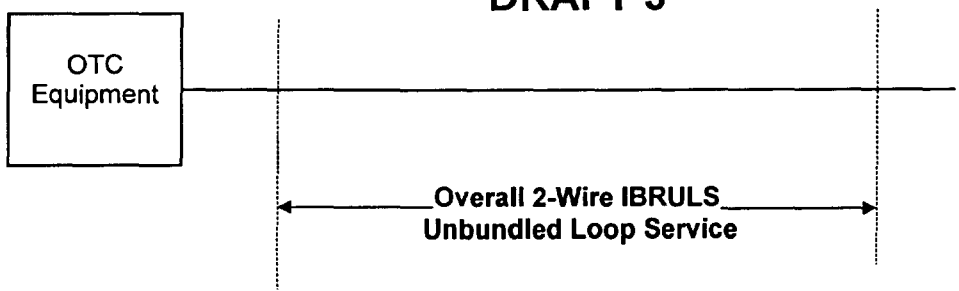


Figure 2-1. Typical 2-Wire IBRULS Configuration

2.08 IBRULS may be provided using a variety of loop transmission technologies, including but not limited to, metallic cable, metallic cable based digital loop carrier, and fiber optic digital loop carrier systems.

2.09 IBRULS supports the ISDN Basic Rate Two-Binary One-Quaternary (2B1Q) line code described in ANSI T1.601. Vendor-specific, non-standard line codes are not supported and the BA spectrum management guidelines do not permit their deployment.

2.10 OTC or CPE equipment connected to an IBRULS shall meet the Power Spectral Density mask in Figure 2-2 below. To verify compliance with this requirement, measurements shall use a noise power bandwidth of 1 kHz.

2.11 CPE that is connected to an IBRULS shall also meet the applicable signal power limits in Part 68 of the FCC Rules [3].

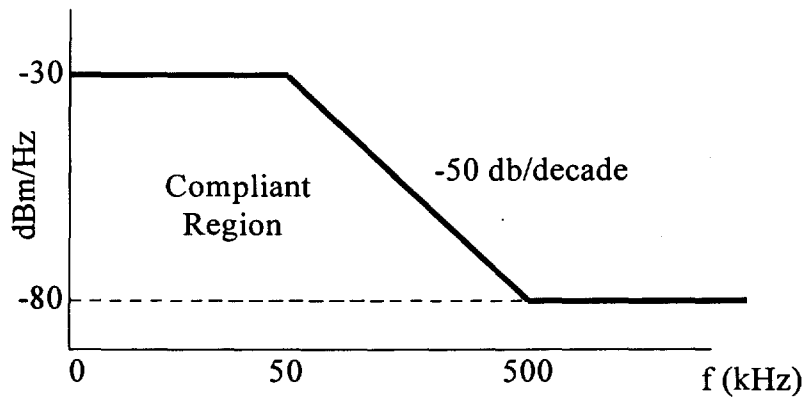


Figure 2-2. Power Spectral Density Mask for ISDN Basic Rate Technology

2.12 IBRULS may not be spectrally compatible in the same cable or binder group with 15 kHz Program Audio services, Type I or Type II Public Switched Digital Service (PSDS), Data-Voice Multiplexers (DVM) associated with CO-LAN services, or Analog Carrier. Additional information about spectrum compatibility may be found in Section 3D(i).

2.13 IBRULS utilizes subscriber loop facilities that were originally designed for Plain Ordinary (analog) Telephone Service (POTS). For this reason, some loops, such as loaded metallic facilities or analog carrier systems, may not be suitable for IBRULS.

2.14 Bell Atlantic will work with the OTC to resolve facility problems should the IBRULS loop facility require enhancement equipment to support BRI service.

C. DS1 (1.544 Mbps) Unbundled Loop Service (DS1ULS)

2.15 DS1ULS provides the OTC with a 4-wire transmission channel that is suitable for the transport of 1.544 Mbps (DS1) digital signals in both directions simultaneously.

2.16 The interface at the OTC DSX-1 termination in the BA CO is 4-wire and the interface at the EU-RDP is 4-wire. If a single circuit NID is provided at the EU-RDP, an RJ48C or an RJ48X connector will be used. The conductors of the OTC or EU transmit pair are called tip and ring and the conductors of the OTC or EU receive pair are called tip 1 and ring 1.

2.17 The transmission channel between the DS1ULS interfaces consists of 4-wire facilities. DS1ULS may be provided using a variety of loop transmission technologies, including but not limited to, metallic cable, metallic cable with a mid-span repeater, metallic cable with High-Bit-Rate Digital Subscriber Line (HDSL) technology, or fiber optic transport systems. A typical DS1ULS configuration is shown in Figure 2-3.

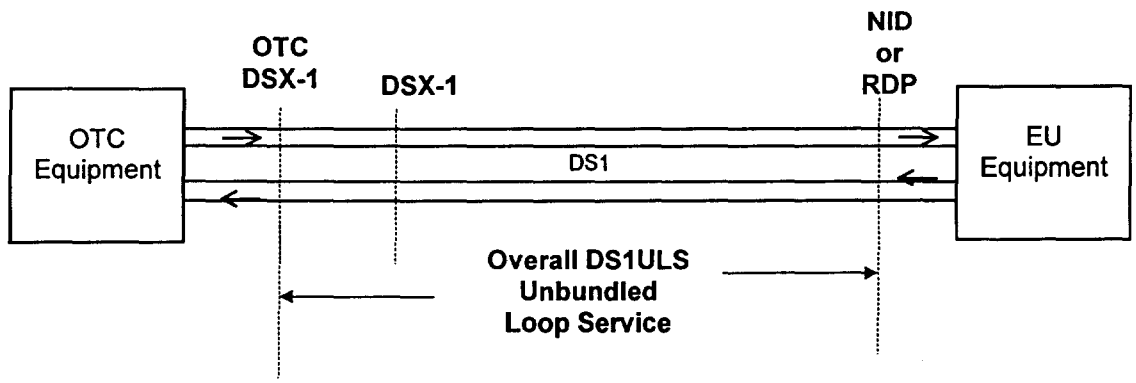


Figure 2-3. Typical 4-Wire DS1ULS Configuration

2.18 DS1ULS enables full duplex 1.544 Mbps digital transmission. The 1.544 Mbps line rate supports an 8 kbps framing format and 1.536 Mbps of payload data. DS1ULS will support either the Superframe (SF) or Extended Superframe (ESF) framing formats as specified in ANSI T1.403-1995 [2].

2.19 DS1ULS is available with either the AMI or B8ZS line codes as specified in ANSI T1.403-1995 [2].

2.20 The DS1 interface provided by BA does not ordinarily deliver direct-current power to the EU-RDP via the simplex leads of the transmit and receive pairs, however when BA employs metallic facilities and no loopback device is deployed, direct-current power will appear at the EU-RDP on the simplex leads. In such cases, the EU equipment shall provide a direct-current connection between the simplexes of the transmit and receive pairs.

2.21 Direct-current power shall not be delivered to the EU-POT by EU customer equipment. In addition, EU customer equipment shall not apply voltages to the EU-POT other than those described in ANSI T1.403-1995 [2].

2.22 The OTC will be responsible for providing synchronization timing for the DS1ULS.

2.23 OTC equipment that is connected to DS1ULS shall meet the applicable signal power limits in ANSI T1.102 [8].

2.24 CPE that is connected to DS1ULS shall meet the applicable signal power limits in ANSI T1.403 [7] and Part 68 of the FCC Rules [3].

2.25 DS1ULS is not spectrally compatible in the same binder group with ADSL technologies or in the same cable with Analog Carrier. Additional information about spectrum compatibility may be found in Section 3D(ii).

2.26 Subscriber loop facilities were originally designed for POTS. For this reason, some loops may not be suitable for DS1ULS.

D. DDS Unbundled Loop Service (DDSULS)

2.27 DDSULS provides the OTC with a 4-wire transmission channel that is suitable for the transport of digital data at a synchronous rate of 56 or 64 kbps simultaneously in both directions. An optional secondary channel operating at 8 kbps is available with the 56 Kbps service. In addition, DDSULS may be used to transport 56 kbps Type I Public Switched Digital Service (PSDS).

2.28 The interface at the OTC CODF termination in the BA CO is 4-wire and the interface at the EU-RDP is 4-wire. If a single circuit NID is provided at the EU-RDP, an RJ48S connector will be used. The conductors of the OTC or EU transmit pair are called tip and ring and the conductors of the OTC or EU receive pair are called tip 1 and ring 1.

2.29 The transmission channel between the DDSULS interfaces consists of 4-wire facilities. DS1ULS may be provided using a variety of loop transmission technologies, including but not limited to, metallic cable, metallic cable with a mid-span repeater, metallic cable based digital loop carrier, and fiber optic digital loop carrier systems. A typical DDSULS configuration is shown in Figure 2-4.

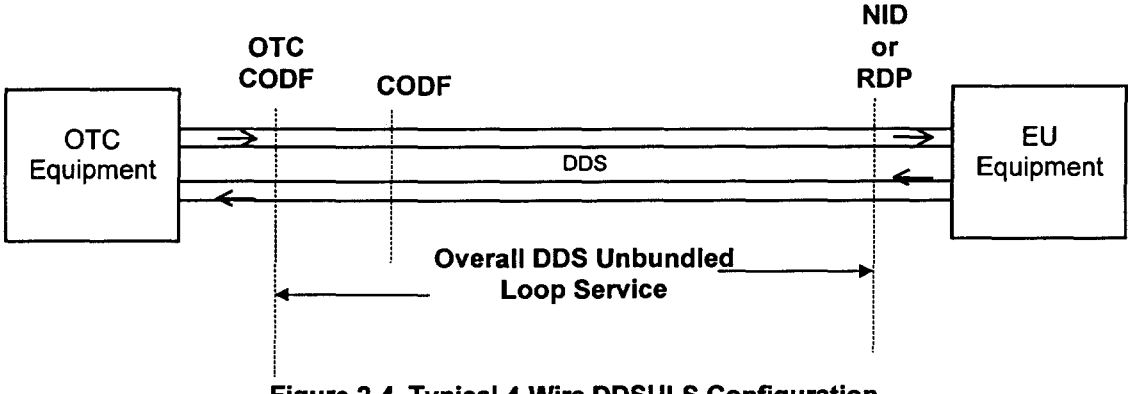


Figure 2-4. Typical 4-Wire DDSULS Configuration

2.30 When metallic cable facilities are used for DDSULS, the OTC is expected to provide byte organization and synchronization timing on the DDS signal to the EU-RDP. The end-user is expected to provide byte organization and synchronization timing on the DDS signal to the OTC.

2.31 When metallic cable facilities are used for DDSULS, the OTC is expected to provide sealing current on the simplex path to the EU-RDP. The end-user is expected to provide a simplex path termination to the OTC. Sealing current is used to seal splices and control a loopback relay in the CPE. The DDSULS sealing current is limited to 120 mA maximum and -130 Vdc maximum. Only dc voltages that are negative with respect to ground may be used for sealing current.

2.32 When metallic cable facilities are used to provide DDSULS, the loops shall be non-loaded and shall meet selected DDS design criteria (see 3.27).

2.33 When metallic cable facilities are used to provide DDSULS, the interface to the OTC shall consist of balanced modified bipolar return-to-zero (BPRZ) signals at the customer data rate. The bipolar format is modified by the inclusion of bipolar violations for network control.

2.34 When universal digital loop carrier (UDLC) is used to provide DDSULS, the UDLC will provide an interface at the EU-RDP that meets the network requirements in ANSI T1.410-1992 [3].

2.35 When UDLC facilities are used to provide DDSULS, interconnection with the OTC will be a DS0 interconnection that meets the DS0-A specifications in ANSI T1.102-1992.

2.36 Since a DS0 interface requires phase alignment between transmitter and receiver in addition to frequency alignment, the collocated OTC must obtain a 64 kbps Composite Clock (CC) timing signal from the same source as the BA UDLC COT. This source will be the BA Building Integrated Timing Supply (BITS) master clock in the particular BA CO.

2.37 Direct-current power shall not be delivered to the EU-POT by CPE. In addition, CPE shall not apply voltages to the EU-POT other than those described in ANSI T1.410-1992 [3] and Part 68 of the FCC Rules.

2.38 Subscriber loop facilities were originally designed for POTS. For this reason, some loops may not be suitable for DDSULS.

E. High-Bit-Rate Digital Subscriber Line Unbundled Loop Service (HDULS)

2.39 Two types of HDULS are available: 2-wire or 4-wire. 2-Wire HDULS provides the OTC with an effective 2-wire channel suitable for the transport of 784 kbps digital signals simultaneously in both directions. 4-Wire HDULS provides the OTC with an effective 4-wire channel suitable for the transport of 1.568 Mbps digital signals simultaneously in both directions. 2-Wire and 4-Wire HDULS channels are suitable for the transport of 2B1Q signals as described in Committee T1 Technical Report No. 28 [4].

2.40 HDULS is currently provided by using suitable non-loaded metallic cable facilities. In the future HDULS may be provided by using other loop transmission technologies, including but not limited to, metallic cable, metallic cable based digital loop carrier, and fiber optic digital loop carrier systems.

i. 2-Wire HDULS

2.41 The 2-wire HDULS channel provides transport for bi-directional full duplex 784 kbps digital signals that support a 768 kbps payload plus framing (8 kbps) and overhead (8 kbps). This is sometimes called single-loop operation.

2.42 The OTC interface at the CODF termination for the effective 2-wire HDULS channel is 2-wire and the interface at the EU-RDP is also 2-wire. If a single circuit NID is provided at the EU-RDP, an RJ11C connector will be used. The effective 2-wire channel ordinarily consists entirely of 2-wire metallic facilities however in the future if Digital Loop Carrier can be used for HDULS then the channel may contain a 4-wire facility portion. A typical 2-wire HDULS configuration is shown in Figure 2-5.

2.43 When metallic facilities are used to provide 2-wire HDULS, the loop shall meet selected Carrier Serving Area design criteria (see 3.27).

ii. 4-Wire HDULS

2.44 The 4-wire HDULS channel provides transport for two bi-directional full duplex 784 kbps digital signals each of which supports a 768 kbps payload plus framing (8 kbps) and overhead (8 kbps). This is sometimes called dual duplex or two full pair full duplex operation.

2.45 The OTC CODF and EU-RDP interfaces for the HDULS channel are 4-wire. If a single circuit NID is provided at the EU-RDP, an RJ48S connector will be used. A typical 4-wire HDULS configuration is shown in Figure 2-6.

2.46 4-Wire HDULS supports the 2B1Q line code. Other line codes are not supported and Bell Atlantic spectrum management rules do not permit their use on HDULS services.

2.47 If and when digital loop carrier (DLC) is used to provide 4-wire HDULS, the DLC will provide two 2-wire interfaces at the OTC-POT and EU-RDP each of which meets the specifications in T1 Technical Report No. 28 [4].

2.48 When metallic facilities are used to provide 4-wire HDULS, both 2-wire loops shall meet selected Carrier Serving Area design criteria (see 3.27). In addition, each 2-wire loop may have different characteristics. The difference in working length plus bridged tap may be as much as 3.3 kft. The pairs may differ in wire gauge, bridged tap, and exposure to crosstalk. The difference in the transmission characteristics of each pair may change slowly due to temperature differences between each loop.

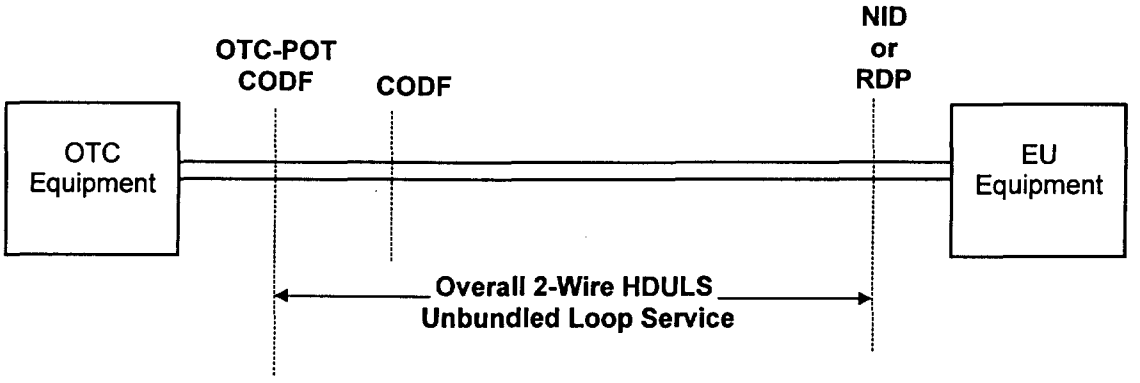


Figure 2-5. Typical 2-Wire HDULS Configuration

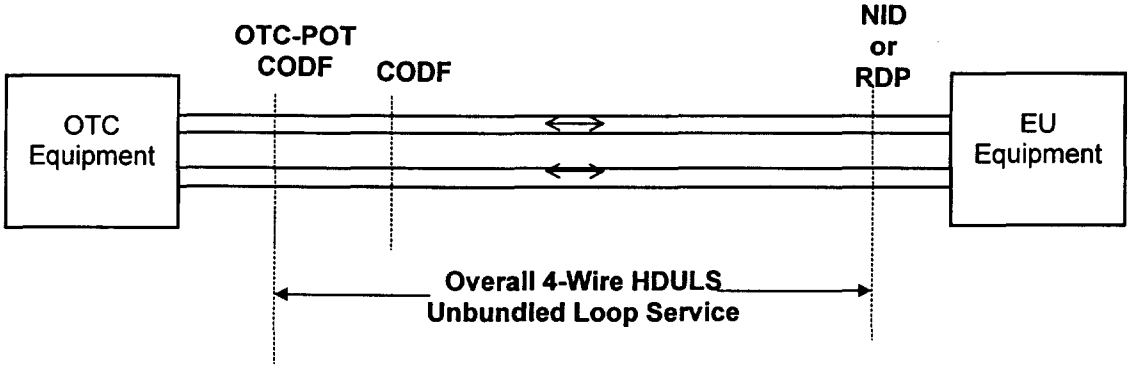


Figure 2-6: Typical 4-Wire HDULS Configuration

iii. HDULS Limitations

2.49 2-Wire HDULS is not intended to support single-pair 1.544 Mbps full duplex HDSL systems that use a single pair and an echo canceled hybrid method to carry a 1.544 Mbps payload plus overhead in both directions simultaneously. Bell Atlantic spectrum management rules do not permit the use of such systems with HDULS services.

2.50 4-wire HDULS is not intended to support Dual-Simplex (2-pair simplex) HDSL systems that use two pairs each carrying a unidirectional signal at a nominal 1.544 Mbps rate plus overhead and Bell Atlantic spectrum management rules do not permit the use of such systems with HDULS services..

2.51 HDULS may not be spectrally compatible in the same cable or binder group with 15 kHz Program Audio services, Type I or Type II Public Switched Digital Service (PSDS), Data-Voice Multiplexers (DVM) associated with CO-LAN services, or Analog Carrier. Additional information about spectral compatibility may be found in Section 3D(iv).

2.52 OTC or CPE equipment connected to an HDULS shall meet the applicable signal power limits in T1 Technical Report No. 28 [10], Part 68 of the FCC Rules [3], and the Power Spectral Density mask in Figure 2-7 below.

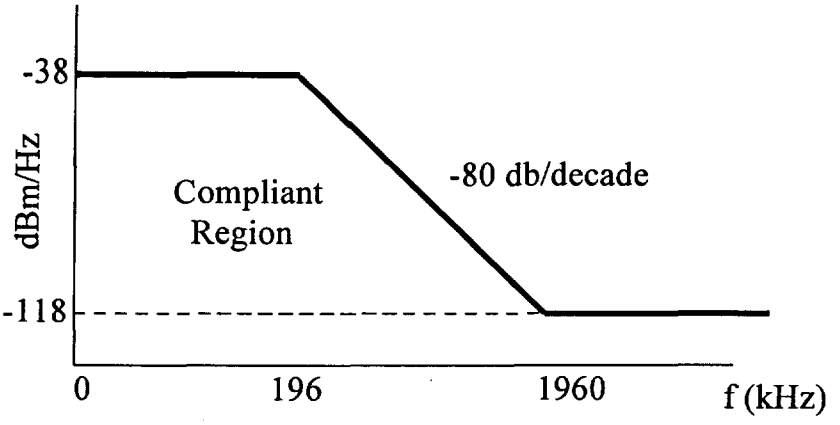


Figure 2-7. Power Spectral Density Mask for HDSL Technology

2.53 Loop power or sealing current applied to an HDULS is limited to the Class A3 voltage limits in Bellcore GR-1089-CORE [14}. Only dc voltages that are negative with respect to ground may be used for sealing current.

2.54 HDULS utilizes subscriber loop facilities that were originally designed for POTS. For this reason, some loops, such as loaded metallic facilities, are not suitable for HDULS.

F. Asymmetrical Digital Subscriber Line (ADSL) Unbundled Loop Service

2.55 ADSL Unbundled Loop Service (ADULS) provides the OTC with an effective 2-wire channel that is suitable for the transport of POTS as well as digital signals. Two types of ADULS are available: ADULS-R (Revised Resistance Design) and ADULS-C (Carrier Serving Area design). The ADULS channels are suitable for the transport of ADSL signals that meet the specifications of ANSI T1.413-1995 [5] or T1E1/97-104R2 [6].

2.56 The ADULS interface at the CODF termination is 2-wire and the interface at the RDP is 2-wire. If a single circuit NID is provided at the EU-RDP, an RJ11C connector will be used. One conductor of the pair is called tip and the other conductor is called ring.

2.57 ADULS is currently provided by using 2-wire non-loaded metallic cable facilities that meet selected Revised Resistance Design (RRD) or Carrier Serving Area (CSA) design criteria, if available. A typical ADULS configuration is shown in Figure 2-8.

i. ADULS-R

2.58 In addition to analog POTS signals, an ADULS-R unbundled loop service is suitable for the transport of Discrete Mulit-Tone (DMT) or Carrierless AM/PM (CAP) signals at rates up to 1.5 Mbps downstream (toward the EU-POT) and up to 176 kbps upstream (from the EU-POT).

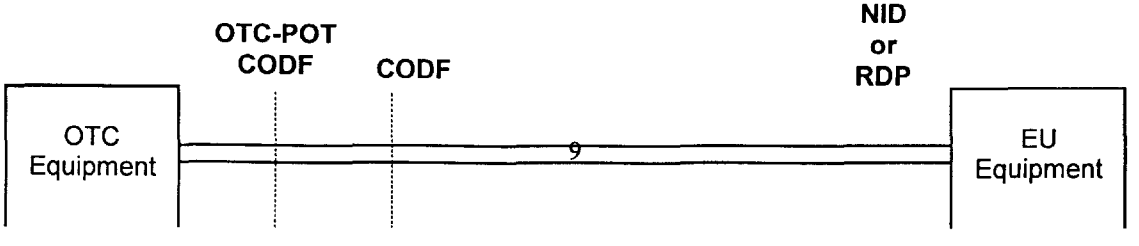


Figure 2-8. Typical 2-Wire ADULS Configuration

2.59 CPE equipment connected to an ADULS-R service shall meet the applicable signal power limits in Part 68 of the FCC Rules [3] and the Power Spectral Density mask in Figure 2-9.

2.60 OTC equipment connected to an ADULS-R service shall meet the Downstream Power Spectral Density mask in Figure 2-10.

2.61 The metallic facilities used to provide ADULS-R shall meet selected RRD design criteria (see 3.30).

2.62 ADULS-R supports loop-start signaling that meets the specifications of ANSI T1.401-1995 [6].

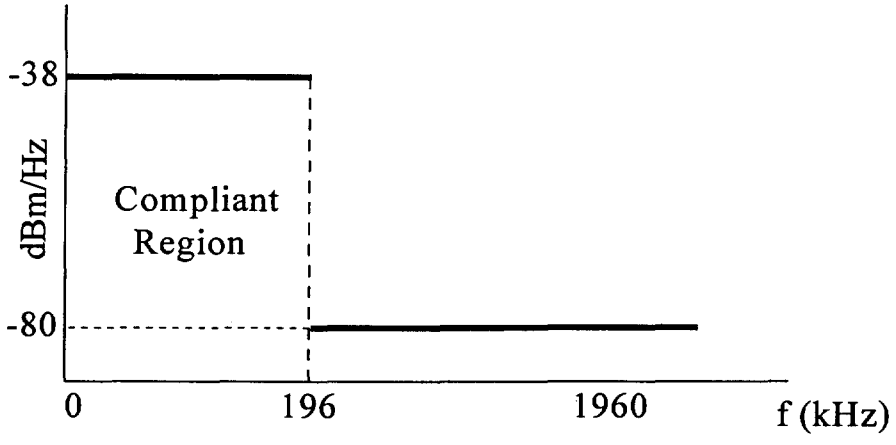


Figure 2-9. Upstream Power Spectral Density Mask for ADSL Technology

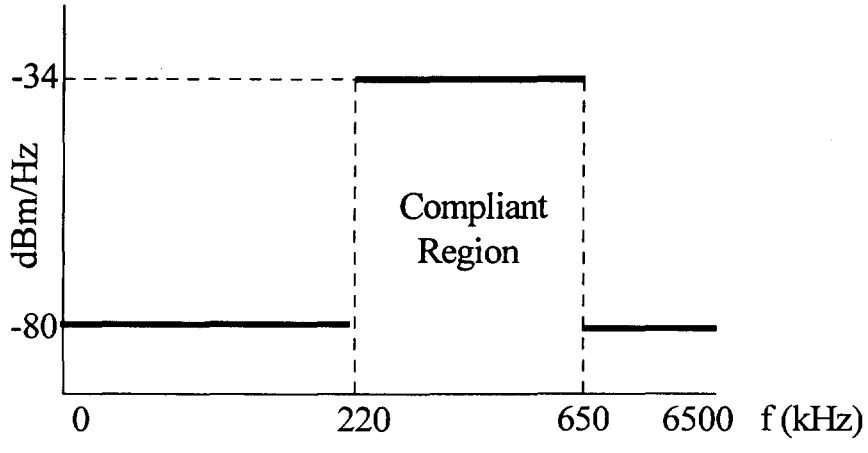


Figure 2-10. Downstream Power Spectral Density Mask for ADULS-R

ii. ADULS-C

2.63 In addition to analog POTS signals, an ADULS-C service is suitable for the transport of Discrete Mulit-Tone (DMT) or Carrierless AM/PM (CAP) signals at rates up to 6 Mbps downstream (toward the EU-POT) and up to 640 kbps upstream (from the EU-POT).

2.64 ADULS-C supports loop-start signaling that meets the specifications of ANSI T1.401-1995 [6].

2.65 CPE equipment connected to an ADULS-C service shall meet the applicable signal power limits in Part 68 of the FCC Rules [3] and the Power Spectral Density mask in Figure 2-9.

2.66 OTC equipment connected to an ADULS-C service shall meet the Downstream Power Spectral Density mask in Figure 2-11.

2.67 The metallic facilities used to provide ADULS-C shall meet selected CSA design criteria (see 3.31).

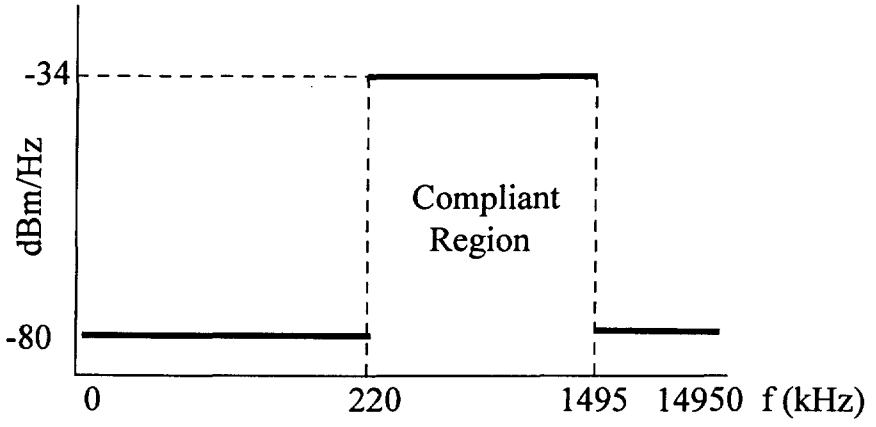


Figure 2-11. Downstream Power Spectral Density Mask for ADULS-C

iii. ADULS Limitations

2.68 ADULS services may not be spectrally compatible in the same cable or binder group with the Data-Voice Multiplexer (DVM) technology associated with CO-LAN services, Analog Carrier systems, T1 technology (including DS1ULS), or some types of ADSL technology. Additional information about spectral compatibility may be found in Section 3D(v).

2.69 ADULS utilizes subscriber loop facilities that were originally designed for POTS. For this reason, some loops, such as loaded metallic facilities, are not suitable for ADULS.

3. Element Specifications

A. General

3.01 Two elements are always used with IBRULS, DDSULS, HDULS, and ADULS services. They are: CODF wire and tie cable(s), and subscriber loop facilities. Figure 3-1 illustrates the service elements and identifies the sections of this document that contain the requirements for each of the elements associated with IBRULS, 2-wire HDULS, and ADULS services. Figure 3-2 illustrates the service elements associated with the DDSULS and 4-wire HDULS services.

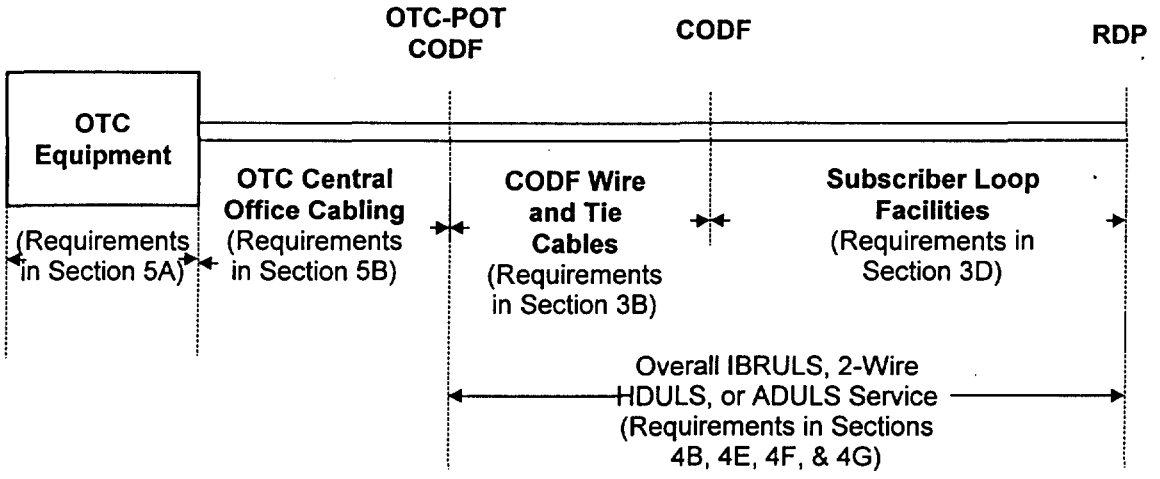


Figure 3-1. IBRULS, 2-Wire HDULS, or ADULS Service Elements

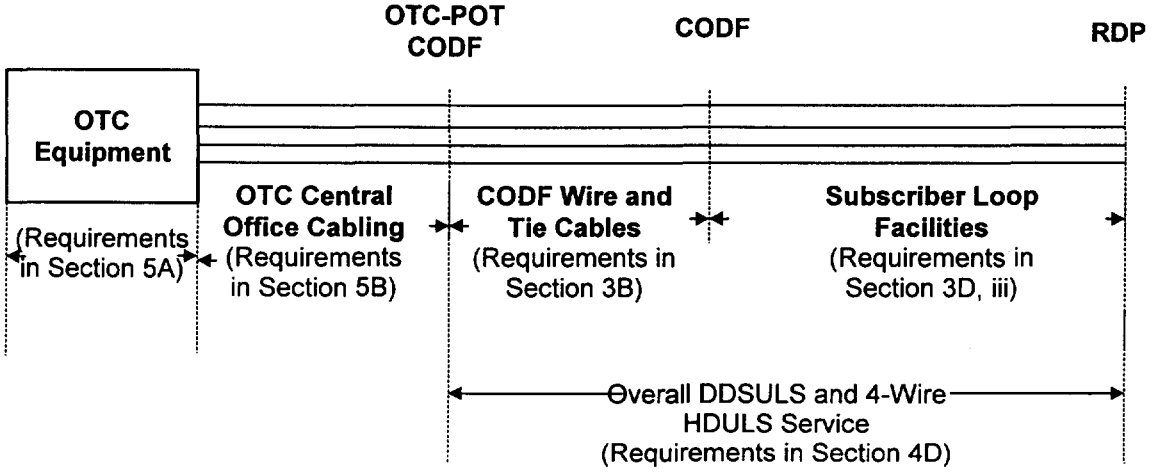


Figure 3-2. DDSULS and 4-Wire HDULS Service Elements

3.02 A third element, electronic transmission enhancement equipment, is sometimes used with IBRULS and DDSULS services. The requirements for IBRULS and DDSULS transmission enhancement equipment are found in section 3E.

3.03 Two elements are always used with DS1ULS services. They are: DSX-1 cross-connect wiring and tie cable(s), and subscriber loop facilities. Figure 3-2 illustrates the DS1ULS service elements and identifies the sections of this document that contain the specifications for each of the elements.

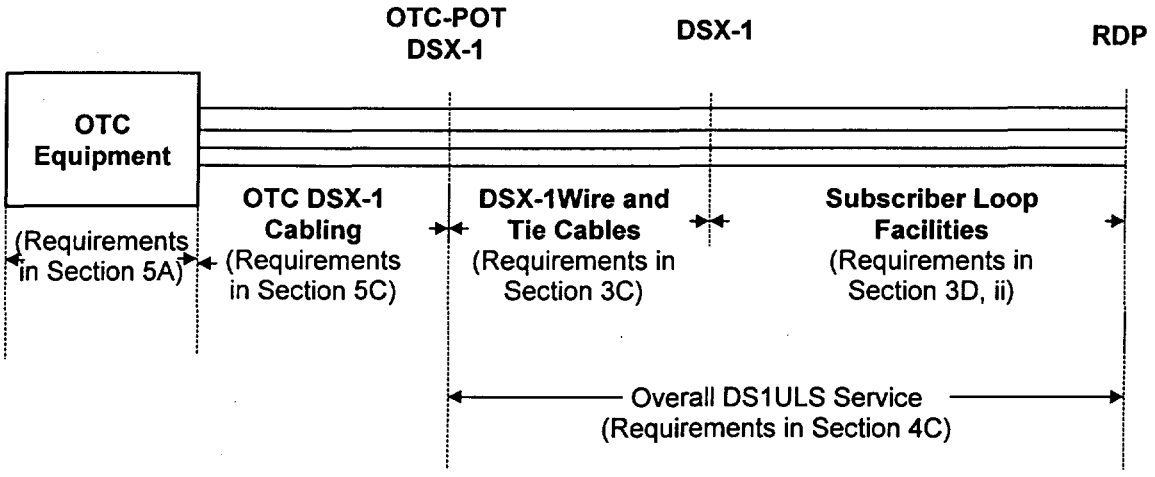


Figure 3-3. DS1ULS Service Elements

B. CODF Wiring and Tie Cable(s)

3.04 CODF cross-connect wiring and tie cable(s) are used to link the CODF termination of collocated OTC equipment to the CODF termination of metallic subscriber loops, DLC COTs, and electronic transmission enhancement equipment.

3.05 The total combined length of all CODF cross-connect wiring and all CODF-to-CODF tie cables between the CODF termination of the OTC equipment and the CODF termination of any subscriber loop in the same CO should be less than 1500 feet. No bridged tap is permitted in the CO.

3.06 The direct-current resistance between the CODF termination of the OTC equipment and the CODF termination of any subscriber loop in the same CO should be less than 80 ohms. This is equal to 1500 or less feet of 24 gauge cable.

3.07 The 1 kHz loss measured on the CODF wiring and tie cables when measured between 900 ohm impedances should be .85 dB or less.

3.08 The C-message noise measured on the wiring and tie cables between the CODF termination of the OTC equipment and the CODF termination of a subscriber loop in the same CO shall be 20 dBrnC or less.

C. DSX-1 Wiring and Repeatered Tie Cable(s)

3.09 DSX-1 cross-connect wiring and tie cable(s) are used to link the DSX-1 termination of OTC equipment to the DSX-1 termination of the BA DS1 subscriber loop. In some cases, an electronic digital cross-connect system may be substituted for the DSX-1.

3.10 The total length of all DSX-1 cross-connect wiring should be less than 85 feet of 22 gauge cable.

3.11 When repeatered tie cables are used to link OTC DSX-1 terminations to BA DSX-1 terminations, the cabling between the repeaters and the DSX-1 panels shall be built-out in each direction of transmission such that the overall cabling and build-out is the equivalent of 655 feet of 22 gauge ABAM cable.

D. Subscriber Loop Facilities

3.12 Subscriber loop facilities consist of feeder and distribution plant between the CODF or DSX-1 and the EU customer's RDP. Feeder plant uses a variety of transmission technologies, including but not limited to, twisted-pair metallic cables, twisted-pair metallic cable based digital loop carrier, and fiber optic based digital loop carrier. Distribution plant usually consists of multipair metallic cables. Additional information about subscriber loops may be found in Bellcore SR-TSV-002275 [7].

3.13 Subscriber loop facilities have been designed on a global basis primarily to accommodate POTS and guarantee that loop transmission loss at 1 kHz is statistically distributed and that no single loop exceeds the signaling range of the CO.

3.14 Prior to 1980, loops were designed using one of the following design plans: Resistance Design, Long Route Design, or Unigauge Design. From 1980 to 1986, the Modified Resistance Design, Modified Long Route Design, and Concentrated Range Extension with Gain plans were applied on a going-forward basis (i.e., retroactive redesign was not implemented). In 1986, the Revised Resistance Design (RRD) plan was applied on a going-forward basis.

3.15 Most metallic loop facilities (98%) were designed using the RD, MRD, or RRD design rules. The RRD design rules currently in use limit the loop resistance to the design range of the CO switch (1300 or 1500 ohms) or 1500 ohms whichever is less. The vast majority of non-loaded loops, designed using these rules, are < 1300 ohms and will support IBRULS without the need for additional transmission enhancement.

i. IBRULS

3.16 IBRULS uses a subscriber loop facility between the BA CO and the EU-RDP. The IBRULS loop is either:

(a) a qualified metallic non-loaded facility consisting of cable and wire between the CODF and the RDP wire with no intermediate electronics; or,

(b) a metallic loop facility with intermediate transmission enhancement equipment that consists of a qualified metallic non-loaded facility between the CODF and intermediate transmission enhancement equipment and a qualified metallic non-loaded facility between the intermediate transmission enhancement equipment and the RDP; or,

(c) a universal digital loop carrier (DLC) facility with 2B+1D ISDN Basic Rate transport capability via three DS0 channels. The DLC facility consists of:

- CO cabling between the CODF and a DLC Central Office Terminal (COT) equipped with an ISDN Basic Rate Interface Terminal Equipment (BRITE) channel unit with NT functionality;
- a fiber or metallic facility from the DLC COT to the DLC Remote Terminal (RT) equipped with an ISDN BRITE channel unit with LT functionality; and,
- a qualified metallic non-loaded facility consisting of cable and wire between the DLC RT and the RDP.

3.17 An IBRULS qualified metallic loop facility shall meet the following non-loaded cable Revised Resistance Design criteria:

(a) The metallic cable shall be non-loaded.
(b) The total length of the cable shall be less than 18 kft.

(c) The direct current resistance measured between the CODF and the EU-RDP shall be 1300 ohms or less.
(d) Loaded bridged tap is not permitted.
(e) The total length of all bridged tap shall be less than 6 kft.
(f) The total cable length plus the bridged tap length shall not exceed 18 kft.
(g) The 40 kHz loss when measured with 135 ohm impedances at each end shall be 40.0 dB or less.

3.18 Metallic loops between the CODF and the RDP that have a 40 kHz loss between 40 and 76 dB will require intermediate transmission enhancement equipment such as a mid-span repeater or similar device. Bell Atlantic spectrum management rules do not permit the placement of more than one mid-span repeater per loop. If a loop will not operate with one repeater, construction of DLC will be necessary..

3.19 The leakage resistance between the tip conductor and ground and the ring conductor and ground on the metallic loop portion of any IBRULS shall each be greater than 100 K ohms.

3.20 The longitudinal noise or power influence (PI) measured per IEEE Std 743-1984 [8] on an IBRULS metallic loop should be less than 90 dBrnC.

3.21 The longitudinal balance of a metallic IBRULS loop is defined as the longitudinal noise (in dBrnC) minus the C-message noise (in dBrnC). The longitudinal balance shall be >50 dB.

3.22 IBRULS will not operate properly on non-staggered twist cable (installed prior to 1923) or on flat ribbon cables, such as those used for some CPE interconnections. Such cable may need to be replaced to accommodate IBRULS.

3.23 It is currently known that Basic Rate ISDN technology is spectrally incompatible with a number of embedded services and technologies. These services and technologies include 15 kHz Program Audio Service, Type I and Type II PSDS, DVM technology associated with CO-LAN service, and analog carrier systems.

3.24 15 kHz Program Audio and IBRULS services should be separated into different binder groups to prevent the Basic Rate ISDN technology from interfering with the 15 kHz Program Audio service. Non-adjacent binder groups are preferred but adjacent binder groups may be adequate.

3.25 Type II PSDS, which is also known as AT&T CSDC, is no longer available from BA. Type III PSDS, which is also known as the Nortel Datapath technology, should be separated into different binder groups than IBRULS in order to prevent the Basic Rate ISDN technology from interfering with Type III PSDS services.

3.26 BA LANGATE service, which is a CO-LAN service that uses DVM technology, is widely deployed in BA. DVMs are spectrally incompatible with IBRULS services depending upon the range at which the DVMs are deployed. If DVMs are operated at less than 80% of the maximum specified range, they are spectrally compatible with IBRULS services. If operated at or above the 80% range, DVMs are not spectrally compatible with IBRULS services and the two should be separated into different binder groups.

3.27 Analog carrier systems are being phased out in BA. Analog Carrier systems and IBRULS services should be assigned to pairs in different cables to prevent IBRULS services from interfering with the Analog Carrier technology.

ii. DS1ULS

3.28 DS1ULS uses a subscriber loop facility between the CO and the EU-RDP. The loop is either:

(a) a qualified metallic non-loaded facility consisting of cable and wire between the CODF and the RDP wire with no intermediate electronics; or,

(b) a qualified metallic non-loaded facility consisting of cable and wire between the CODF and the RDP wire with transmission enhancement equipment such as regenerators or HDSL technology; or,

(c) a fiber facility with optical multiplexing equipment at each end from the CO to a Remote Terminal (RT) location with qualified metallic non-loaded cable and wire between the DLC RT and the RDP.

3.29 When DS1ULS is provided using 4-wire facilities with HDSL electronics at each end, each pair shall meet Carrier Serving Area (CSA) design criteria.

3.30 When DS1ULS facilities are 4-wire non-loaded facilities without electronics, the facility must not have bridged tap and the length is limited to 3000 feet (nominal).

3.31 4-wire T1 span facilities used with DS1ULS are designed with regenerators spaced every 6000 feet (nominal) and with nominal 3000 foot end sections toward the CO and the end-user.

3.32 It is currently known that T1 technology is spectrally incompatible with Analog Carrier systems and ADSL technology and ADULS services.

3.33 Analog Carrier systems are being phased out in BA. Analog Carrier systems and the T1 technology used for DS1ULS services should be assigned to pairs in different cables to prevent the DS1ULS services from interfering with the Analog Carrier systems.

3.34 ADSL technology (including ADULS services) and T1 technology (including applicable DS1ULS services) should be separated into non-adjacent binder groups in order to prevent the ADSL technology from interfering with the T1 technology.

iii. DDSULS

3.35 DDSULS uses a subscriber loop facility between the BA CO and the EU-RDP. The DDSULS loop is either:

(a) a DDS qualified metallic non-loaded facility consisting of cable and wire between the CODF and the RDP wire with no intermediate electronics; or,

(b) a metallic loop facility with intermediate transmission enhancement equipment that consists of a qualified metallic non-loaded facility between the CODF and intermediate transmission enhancement equipment and a qualified metallic non-loaded facility between the intermediate transmission enhancement equipment and the RDP; or,

(c) a universal digital loop carrier (DLC) facility with DDS dataport transport capability a single DS0 channel. The DLC facility consists of:

- CO cabling between the CODF and a DLC Central Office Terminal (COT) equipped with a DDS DS0 channel unit;
- a fiber or metallic facility from the DLC COT to the DLC Remote Terminal (RT) equipped with a DDS OCU channel unit; and,
- a qualified metallic non-loaded facility consisting of cable and wire between the DLC RT and the RDP.

3.36 A DDSULS qualified metallic loop facility shall meet the following non-loaded cable Revised Resistance Design criteria:

(a) The metallic cable shall be non-loaded.
(b) The total length of the cable shall be less than 18 kft.
(c) The direct current resistance measured between the CODF and the EU-RDP shall be 1300 ohms or less.
(d) Loaded bridged tap is not permitted.
(e) The total length of all bridged tap shall be less than 2.0 kft.
(f) The total cable length plus the bridged tap length shall not exceed 18 kft.
(g) The 28 kHz loss when measured with 135 ohm impedances at each end shall be 34.0 dB or less.

3.37 Metallic loops between the CODF and the RDP that have a 28 kHz loss greater than 34 dB when measured with 135 ohm impedances, will require intermediate transmission enhancement equipment such as a mid-span repeater or similar device. Bell Atlantic spectrum management rules do not permit the placement of more than one mid-span repeater per loop. If a loop will not operate with one repeater, construction of DLC will be necessary..

3.38 The leakage resistance between the tip conductor and ground and the ring conductor and ground on the metallic loop portion of any DDSULS shall each be greater than 300 K ohms.

3.39 The longitudinal noise or power influence (PI) measured per ANSI IEEE Std 743-1995 [8] on an DDSULS metallic loop should be less than 90 dBrnC.

3.40 The longitudinal balance of a metallic DDSULS loop is defined as the longitudinal noise (in dBrnC) minus the C-message noise (in dBrnC). The longitudinal balance shall be >50 dB.

3.41 DDSULS will not operate properly on non-staggered twist cable (installed prior to 1923) or on flat ribbon cables, such as those used for some CPE interconnections. Such cable may need to be replaced to accommodate DDSULS.

iv. 2-Wire and 4-wire HDULS

3.42 2-Wire and 4-Wire HDULS use a subscriber loop facility between the CO and the EU-RDP. The subscriber loop is a 2-wire or 4-wire metallic non-loaded facility consisting of cable and wire between the CODF and the RDP wire with no intermediate electronics.

3.43 Qualified 2-Wire and 4-Wire HDULS metallic loop facilities should meet the following selected Carrier Serving Area design criteria:

(a) The cable shall be non-loaded.
(b) The total of all bridged tap length shall not exceed 2.5 kilofeet (kft).
(c) The total length of a cable consisting entirely of 26 gauge plus the total bridged tap length shall not exceed 9 kft.
(d) The total length of a cable consisting entirely of 19, 22, or 24 gauge cable or a mixed gauge cable plus the total bridged tap length shall not exceed 12 kft.
(e) The dc resistance of the loop measured between the CODF and the EU-RDP shall be 750 ohms or less.
(f) Loaded bridged tap is not permitted.

3.44 The leakage resistance between the tip conductor and ground and the ring conductor and ground on the metallic loop portion of any HDULS shall each be greater than 300 K ohms.

3.45 It is currently known that HDSL technology is spectrally incompatible with a number of embedded services and technologies. These services and technologies include 15 kHz Program Audio Service, Type I and Type II PSDS, DVM technology associated with CO-LAN service, and Analog Carrier systems.

3.46 15 kHz Program Audio and HDULS services should be separated into different binder groups to prevent the HDSL technology from interfering with the 15 kHz Program Audio service. Non-adjacent binder groups are preferred but adjacent binder groups may be adequate.

3.47 Type II PSDS, which is also known as AT&T CSDC, is no longer available from BA. Type III PSDS services (Nortel Datapath technology) and HDULS services should be separated into different binder groups to prevent the HDULS services from interfering with the Type III PSDS services.

3.48 BA LANGATE service, which is a CO-LAN service that uses DVM technology, is widely deployed in BA. DVMs are spectrally incompatible with HDULS services depending upon the range at which the DVMs are deployed. If DVMs are operated at less than 80% of the maximum specified range, they are spectrally compatible with HDULS services. If operated at or above the 80% range, DVMs are not spectrally compatible with HDULS services and the two should be separated into different binder groups.

3.49 Analog Carrier systems are being phased out in BA. Analog Carrier systems and HDULS services should be assigned to pairs in different cables to prevent HDULS services from interfering with the Analog Carrier systems.

v. ADULS-R and ADULS-C

3.50 ADULS-R and ADULS-C use a subscriber loop facility between the CO and the EU-RDP.

3.51 An ADULS-R metallic loop facility should meet the following Revised Resistance Design criteria:

(a) The cable shall be non-loaded.
(b) The total length of all bridged tap shall be less than 6 kft.
(c) The total length of the cable shall be less than 18 kft.
(d) The total length of the cable plus the bridged tap length shall not exceed 18 kft.
(e) The direct current resistance of the loop measured between the CODF and the EU-RDP shall be 1300 ohms or less.
(f) Loaded bridged tap is not permitted.

3.52 An ADULS-C metallic loop facility should meet the following selected Carrier Serving Area design criteria:

(a) The cable shall be non-loaded.
(b) The total of all bridged tap length shall not exceed 2.5 kft.
(c) The total length of a cable consisting entirely of 26 gauge plus the total bridged tap length shall not exceed 9 kft.
(d) The total length of a cable consisting entirely of 19, 22, or 24 gauge cable or a mixed gauge cable plus the total bridged tap length shall not exceed 12 kft.
(e) The dc resistance of the loop measured between the CODF and the EU-RDP shall be 750 ohms or less.
(f) Loaded bridged tap is not permitted.

3.53 The leakage resistance between the tip conductor and ground and the ring conductor and ground on ADULS metallic loops shall each be greater than 300 K ohms.

3.54 The 1kHz loss acceptance limit of an ADULS-R metallic loop facility when measured with a 900 ohm impedance at the CODF and a 600 ohm impedance at the RDP shall be 8.5 dB or less.

3.55 The 1kHz loss acceptance limit of an ADULS-C metallic loop facility when measured with a 900 ohm impedance at the CODF and a 600 ohm impedance at the RDP shall be 5.0 dB or less.

3.56 The C-message noise measured on an ADULS-R or ADULS-C metallic loop at the RDP shall be less than 30 dBrnC.

3.57 The longitudinal noise or power influence (PI) measured per IEEE Std 743-1995 [8] on an ADULS-R or ADULS-C metallic loop should be less than 90 dBrnC.

3.58 The longitudinal balance of a metallic ADULS loop is defined as the longitudinal noise (in dBrnC) minus the C-message noise (in dBrnC). The longitudinal balance shall be >50 dB.

3.59 ADULS will not operate properly on non-staggered twist cable (installed prior to 1923) or on flat ribbon cables, such as those used for some CPE interconnections. Such cable may need to be replaced to accommodate ADULS.

3.60 It is currently known that ADSL technology is spectrally incompatible with a number of embedded services and technologies. These services and technologies include the DVM technology associated with CO-LAN service, Analog Carrier systems, T1 technology (including some DS1ULS), and some ADSL applications.

3.61 BA LANGATE service, which is a CO-LAN service that uses DVM technology, is widely deployed in BA. DVMs are spectrally incompatible with ADULS services depending upon the range at which the DVMs are deployed. If DVMs are operated at less than 80% of the maximum specified range, they are spectrally compatible with ADULS services. If operated at or above the 80% range, DVMs are not spectrally compatible with ADULS services and the two should be separated into different binder groups.

3.62 Analog Carrier systems are being phased out in BA. Analog Carrier systems and ADULS services should be assigned to pairs in different cables to prevent ADULS services from interfering with the Analog Carrier systems.

3.63 T1 technology (including applicable DS1ULS services) and ADULS services should be separated into non-adjacent binder groups in order to prevent the ADULS services from interfering with the T1 technology.

3.64 ADULS services are not intended for applications that have spectral energy in frequency bands that can interfere with ADSL technology or other ADULS services. Such applications include:

- Reverse ADSL applications (i.e., End-user CPE transmits downstream frequencies and CO equipment transmits upstream frequencies);
- End-user to end-user ADSL applications (i.e., The CPE at one end transmits downstream frequencies);
- Echo canceling ADSL technology that permits the upstream frequency band to overlap the downstream frequency band defined in this document.

E. Transmission Enhancement Equipment

3.65 Transmission enhancement equipment is sometimes used with IBRULS and DDSULS. Such equipment can consist of a CO span power module, a mid-span repeater, or BRI extended range system equipment.

3.66 The span power module is located in the CO and provides power to an IBRULS mid-span repeater. An IBRULS mid-span repeater regenerates the 2B1Q line code. The repeater has NT functionality that faces the OTC equipment and LT functionality that faces the RDP. A mid-span repeater is deployed when the calculated loss of the non-repeatered loop at 40 kHz (excluding BT) is > 40.0 < 76.0 dB.

3.67 BRI extended range systems consist of a unit located in the CO that has NT functionality and a 2B1Q line code that faces the OTC equipment and a remote unit near the RDP that has LT functionality and delivers a 2B1Q line code to the EU customer. The CO unit uses a line code that is spectrum compatible with

BA services. The line code permits operation with a remote unit that is connected via a metallic cable that could have a 40 kHz loss of up to 60 dB.

3.68 A DDSULS mid-span repeater regenerates the DDS line code. A mid-span repeater is deployed when the calculated loss of the non-repeatered loop at 28 kHz is > 34.0 < 68.0 dB.

3.69 The impedance of transmission enhancement equipment used with IBRULS or DDSULS shall be a nominal 135 ohms.

3.70 Transmission enhancement equipment for IBRULS or DDSULS shall provide sealing current when the RDP is terminated by a direct-current resistance of 135 ohms.

4. Service Specifications

A. General

4.01 Parameters are tested at the RDP in response to trouble reports or when additional testing is purchased.

4.02 Network Channel (NC) and Network Channel Interface (NCI) codes are used for providing channel and interface information to customers. The NC/NCI code set facilitates the identification of network channel requirements and associated interface specifications for services described in tariffs.

4.03 For switched services, the NC code is an encoded representation of the channel that is provided by from the OTC Point Of Termination (POT) to the BA CO. By varying the NC code, the customer is allowed to further specify the type of service.

4.04 The NCI code is an encoded representation used to identify five interface elements located at a POT. The five elements reflect the following physical and electrical characteristics: number of physical conductors, protocol, impedance, protocol options, and transmission levels points (if applicable).

4.05 Examples of the most common NC and NCI codes are given for each service described in this section. The complete set of codes may be found in SR-STS-000307 [9].

4.06 Valid NCI code combinations are shown for each service described in this section. Complete NC/NCI compatibility information may be found in SR-STS-000323 [10].

B. IBRULS

4.07 The overall end-to-end IBRULS service is from the CODF termination of the OTC equipment to the EU customer's RDP. IBRULS services will use the DYVU service code.

4.08 IBRULS NC code information is shown in Figure 4-1 and IBRULS NCI code combinations are shown in Figure 4-2.

4.09 IBRULS Acceptance Limits (AL) and Immediate Action Limits (IAL) are shown in Table 4-3.

4.10 When digital loop carrier (DLC) is used to provide IBRULS, the DLC will provide an ISDN Basic Rate interface at the RDP that meets the network requirements in ANSI T1.601-1992 [1].

Figure 4-1: IBRULS NC Codes

NC CODE	Character 3	Character 4
UB	-	-

Figure 4-2: IBRULS NCI Code Combinations

OTC-POT	EU-POT
02QC5.OOS	02IS5

Figure 4-3: IBRULS Acceptance Limits (AL) and Immediate Action Limits (IAL)

Parameter	AL	IAL
40 kHz loss	< 40.0 dB	> 42.0 dB
Loop Resistance	< 1300 ohms	> 1300 ohms
Insulation Resistance	> 100 kilohms	< 100 kilohms
Power Influence	< 90 dB	> 90 dB

C. DS1ULS

4.11 The overall end-to-end DS1ULS service is from the DSX-1 termination of the OTC equipment to the EU customer's RDP. DS1ULS services will use the DHDU service code.

4.12 DS1ULS shall provide an electrical DSX-1 interface at the OTC-POT that meets the DSX-1 specifications in ANSI T1.102-1993 [11]. The DS1 interface at the RDP shall meets the network specifications in ANSI T1.403-1995 [2].

4.13 DS1ULS NC code information is shown in Figure 4-8, and DS1ULS NCI code combinations are shown in Figure 4-9.

4.14 DS1ULS performance objectives are shown in Figure 4-10 and DS1ULS test limits are shown in Figure 4-11.

4.15 Availability is a measure of the relative amount of time that a service is "usable" by the customer. Unavailability begins when the Bit Error Ratio (BER) in each second is worse than 1×10^{-3} for a period of 10 consecutive seconds. The DS1ULS objective is 99.925 percent availability in any twelve consecutive months. Availability equals the total time minus the outage time divided by the total time.

4.16 Accuracy denotes the error performance and is usually specified in terms of errored seconds (ES), or conversely, error-free seconds (EFS). EFS are the primary measure of error performance for DS1ULS. An EFS is any second that an error does not occur.

4.17 A Severely Errored Second (SES) is any one second interval that has a BER of less than (worse than) 1×10^{-3}.

Figure 4-4: DS1ULS NC Codes

NC CODE	Character 3	Character 4
HC	- (SF and AMI)	-
HC	D (ESF and AMI)	-
HC	E (ESF and B8ZS)	-
HC	Z (SF and B8ZS)	-
HC	E (ESF and B8ZS)	I (ISDN PRA)

Figure 4-5: DS1ULS NCI Code Combinations

OTC-POT	EU-POT
04QB9.11	04DU9-BN (SF and AMI)
04QB9.11	04DU9-DN (SF and B8ZS)
04QB9.11	04DU9-1KN (ESF and AMI)
04QB9.11	04DU9-1SN (ESF and B8ZS)

Figure 4-6: DS1ULS Performance Objectives

Parameter	Objective
Accuracy	0.25 % errored seconds long-term (30 days or more)
Availability	99.925 % per year

Figure 4-7: DS1ULS Test Limits

Test Duration	Errored Seconds	Severely Errored Seconds
15 min	0	0
30 min	3	0
45 min	5	2
24 hours	150	7

4.18 Acceptance testing for DS1ULS should be performed with a Quasi Random Signal Source (QRSS), on an OTC-POT to EU-POT basis, using ES performance parameters.

4.19 If BA has installed a loopback device on the DS1ULS, a dispatch for "cooperative testing" will not ordinarily be made and testing will be performed remotely. Normally, a technician will be dispatched by BA in the following instances:

(a) The DS1ULS is not equipped with a loopback device;
(b) The loopback device is inoperable;
(c) Test results do not meet applicable limits;
(d) The OTC requests a dispatch.

4.20 At the request of the OTC, BA will provide the remote test results to the OTC.

4.21 Other tests may be performed in response to trouble reports or when additional testing is purchased. The 3/24, 1/8, and All Ones patterns are acceptable diagnostic stress tests for DS1ULS when used in accordance with Figure 4-8.

4.22 The patterns in Figure 4-8 may not detect all possible troubles. Additional tests may be required using other patterns designed to detect specific problems (e.g. bridged tap, etc).

4.23 If errors are detected using the QRSS, 3/24, or 1/8 patterns, it is recommended that the DS1ULS line code options (AMI/B8ZS) be verified using the procedures outlined in the Bell Atlantic Network Services Reference Manual Series 72710 & NS6050 [12]. These tests make use of the Framed 2/8 and Framed 1/8 patterns.

Figure 4-8: Pattern sensitivity test criteria (see notes 1 and 2)

TEST PATTERN	TEST	ACCEPTANCE

(see note 3)	DURATION	LIMIT[1]
All Ones	5 minutes	0
3/24 (AMI only)	5 minutes	0
1/8	5 minutes	0
Framed All Zeros (4) (B8ZS only)	30 seconds	(see note 5)

Notes:

(1) Test patterns should be framed.

(2) One retest is allowed if the initial test fails.

(3) If compatible test equipment is not available to perform these tests, loopback testing should be utilized.

(4) WARNING: If used with the DS1 SF framing format, zeros will occur in time slot 2 of every octet (channel). Terminal equipment will display a false Remote Alarm Indication (a.k.a., yellow alarm). In addition, the use of the framed all-zeros pattern through some types of DS3 equipment may cause DS1 failure if the equipment is not properly optioned for B8ZS.

(5) As an equipment option check, failure will typically be seen as large error counts. Very low counts (e.g., 1 or 2 errors) are not indicative of an optioning problem.

D. DDSULS

4.24 The overall end-to-end DDSULS service is from the CODF termination of the OTC equipment to the EU customer's RDP. DDSULS services will use the DWDU (56 kbps), PCDU (Switched 56), DWHC (56 kbps with secondary channel), and DCDU (64 kbps) service codes.

4.25 DDSULS NC code information is shown in Figure 4-9 and DDSULS NCI code combinations are shown in Figure 4-10.

4.26 DDSULS Acceptance Limits (AL) and Immediate Action Limits (IAL) are shown in Table 4-11.

Figure 4-9: DDSULS NC Codes

NC CODE	Character 3	Character 4
LX	-	-

Figure 4-10: DDSULS NCI Code Combinations

OTC-POT	EU-POT
04QC5.OOP (56 kbps)	04DU5.56 (56 kbps)
04QC5.OOP (56 kbps)	04DU5.56A (Switched 56 kbps)
04QC5.OOP (56 kbps)	04DU5.56S (56 kbps with Secondary Channel)

[1] While some of the entries in this table are "0", it should be noted that an isolated error event is not necessarily indicative of a service affecting problem.

04QC5.OOQ (64 kbps)	04DU5.64 (64 kbps)

Figure 4-11: DDSULS Acceptance Limits (AL) and Immediate Action Limits (IAL)

Parameter	AL	IAL
Foreign Voltage	< 1 volt	> 1 volt
Insulation Resistance	> 300 kilohms	< 120 kilohms
Loop Resistance	< 1300 ohms	> 1300 ohms
28 kHz Loss	≤ 34 dB	> 34 dB
Background Noise (50 kb filter)	≤ 28 dBrn	> 28 dBrn
Impulse Noise	≤ 7 counts in 15 minutes with 44 dBrn threshold	> 7 counts in 15 minutes with 44 dBrn threshold
Power Influence	< 90 dB	> 90 dB

E. HDULS

4.27 The overall end-to-end HDULS service is from the CODF termination of the OTC equipment to the EU customer's RDP. HDULS services will use the AQDU service code.

4.28 HDULS NC code information is shown in Figure 4-12 and HDULS NCI code combinations are shown in Figure 4-13.

4.29 HDULS Acceptance Limits (AL) and Immediate Action Limits (IAL) are shown in Table 4-14.

Figure 4-12: HDULS NC Codes

NC CODE	Character 3	Character 4
LX	C (NL CSA < 12kft)	-

Figure 4-13: HDULS NCI Code Combinations

OTC-POT	EU-POT
02QB5.OOH (2-Wire HDULS)	02DU5.OOH
04QB5.OOH (4-Wire HDULS)	04DU5.OOH

Figure 4-14: HDULS Acceptance Limits (AL) and Immediate Action Limits (IAL)

Parameter	AL	IAL
Foreign Voltage	< 1 volt	> 1 volt
Insulation Resistance	> 300 kilohms	< 120 kilohms
Loop Resistance	< 750 ohms	> 750 ohms
100 kHz Loss	≤ 36 dB	> 36 dB
Wideband Noise (50 kb filter)	≤ 28 dBrn	> 28 dBrn
Impulse Noise	≤ 7 counts in 15 minutes	> 7 counts in 15 minutes

	with 44 dBrn threshold	with 44 dBrn threshold
Power Influence	< 90 dB	> 90 dB

F. ADULS-R

4.30 The overall end-to-end ADULS-R service is from the CODF termination of the OTC equipment to the EU customer's RDP. ADULS-R services will use the ARSU and ARDU service codes.

4.31 ADULS-R NC code information is shown in Figure 4-15 and ADULS-R NCI code combinations are shown in Figure 4-16.

4.32 ADULS-R Acceptance Limits (AL) and Immediate Action Limits (IAL) are shown in Table 4-17.

Figure 4-15: ADULS-R NC Codes

NC CODE	Character 3	Character 4
LX	R (NL RRD < 18kft)	-

Figure 4-16: ADULS-R NCI Code Combinations

OTC-POT	EU-POT
02QB9.OOA (DMT)	02DU9.OOA (DMT)
02QB9.OOC (CAP)	02DU9.OOC (CAP)
02QB9.O1A (POTS + DMT)	02DU9.O1A (POTS + DMT)
02QB9.O1C (POTS + CAP)	02DU9.O1C (POTS + CAP)

Figure 4-17: ADULS-R Acceptance Limits (AL) and Immediate Action Limits (IAL)

Parameter	AL	IAL
Foreign Voltage	< 1 volt	> 1 volt
Insulation Resistance	> 300 kilohms	< 120 kilohms
Loop Resistance	< 1300 ohms	> 1300 ohms
1004 Hz loss *	< 8.5 dB	> 10.0 dB
100 kHz Loss	≤ 53 dB	> 53 dB
C-Message Noise *	< 30 dBrnC	> 30 dBrnC
Wideband Noise (50 kb filter)	≤ 28 dBrn	> 28 dBrn
Impulse Noise	≤ 7 counts in 15 minutes with 44 dBrn threshold	> 7 counts in 15 minutes with 44 dBrn threshold
Power Influence	< 90 dB	> 90 dB

* Voice band parameters do not apply to non-POTS applications.

G. ADULS-C

4.33 The overall end-to-end ADULS-C service is from the CODF termination of the OTC equipment to the EU customer's RDP. ADULS-C services will use the ARSU and ARDU service codes.

4.34 ADULS-C NC code information is shown in Figure 4-18 and ADULS-C NCI code combinations are shown in Figure 4-19.

4.35 ADULS-C Acceptance Limits (AL) and Immediate Action Limits (IAL) are shown in Table 4-20.

Figure 4-18: ADULS-C NC Codes

NC CODE	Character 3	Character 4
LX	C (NL CSA < 12kft)	-

Figure 4-19: ADULS-C NCI Code Combinations

OTC-POT	EU-POT
02QB9.OOA (DMT)	02DU9.OOA (DMT)
02QB9.OOC (CAP)	02DU9.OOC (CAP)
02QB9.O1A (POTS + DMT)	02DU9.O1A (POTS + DMT)
02QB9.O1C (POTS + CAP)	02DU9.O1C (POTS + CAP)

Figure 4-20: ADULS-C Acceptance Limits (AL) and Immediate Action Limits (IAL)

Parameter	AL	IAL
Foreign Voltage	< 1 volt	> 1 volt
Insulation Resistance	> 300 kilohms	< 120 kilohms
Loop Resistance	< 750 ohms	> 750 ohms
1004 Hz loss *	< 5.0 dB	> 6.0 dB
100 kHz Loss (between 100ohms)	≤ 36 dB	> 36 dB
C-Message Noise*	< 30 dBrnC	> 30 dBrnC
Wideband Noise (50 kb filter)	≤ 28 dBrn	> 28 dBrn
Impulse Noise	≤ 7 counts in 15 minutes with 44 dBrn threshold	> 7 counts in 15 minutes with 44 dBrn threshold
Power Influence	< 90 dB	> 90 dB

* Voice band parameters do not apply to non-POTS applications.

5. OTC Equipment and CO Cabling Requirements

A. OTC Equipment Requirements

5.01 Collocated OTC equipment used for interconnection with digital unbundled loop services shall meet all of the applicable generic equipment requirements in Bellcore GR-63-CORE [13] and Bellcore GR-1089-CORE [14].

5.02 Collocated OTC equipment used for interconnection with digital unbundled loop services shall be manufactured in accordance with FCC, NEC, UL, and USDL requirements and orders applicable to Federal, State, and local requirements including, but not limited to, statutes, rules, regulations, orders, or ordinances, or otherwise imposed by law. Requirements that are not specified in this document, contractual technical requirements, or other applicable documents, shall meet the manufacturer's requirements consistent with industry standards.

5.03 The open circuit tip-to-ring dc voltage that collocated OTC equipment applies to BA VF cabling shall be less than 80 Vdc.

5.04 Collocated OTC equipment shall not deliver more than 2.5 watts of power to any load via BA VF cable.

5.05 Collocated OTC equipment shall not deliver more than 150 mA of loop current to any load via BA VF cable.

5.06 The noise limits for digital unbundled loop services require collocated OTC equipment to have a longitudinal balance of >60 dB.

5.07 The loss and noise limits for IBRULS requires collocated OTC equipment to have a nominal impedance of 135 ohms.

5.08 The maximum power level of any transmitted signal on an IBRULS shall not exceed the PSD mask in Figure 2-2 and the specifications in ANSI T1.601-1992 [1].

5.09 The maximum power level of any transmitted signal on a DS1ULS shall not exceed the specifications in ANSI T1.403-1993 [2].

5.10 The maximum power level of any transmitted signal on a DDSULS shall not exceed the specifications in ANSI T1.410-1992 [3].

5.11 The maximum power level of any transmitted signal on an HDULS shall not exceed the PSD mask in Figure 2-7 and the specifications in T1 Technical Report No. 28 [4].

5.12 The maximum power level of any transmitted downstream signal on an ADULS-R shall not exceed the downstream PSD mask in Figure 2-10 and the maximum power level of any transmitted downstream signal on an ADULS-C shall not exceed the downstream PSD mask in Figure 2-11.

5.13 Loops may be exposed to electrical surges from lightning and commercial power system disturbances. Despite protective devices on the CODF, some of these disturbances are likely to reach OTC equipment. OTC equipment shall be designed to withstand certain surges without being damaged, and shall fail in a safe manner under infrequent high stress.

5.14 The prevalent voltage-limiting device available for CO use is the 3-mil carbon block. This device has an upper 3σ limiting voltage of 1000 volts peak under surge conditions and 600 volts rms (800 peak) at 60 Hz. OTC equipment connected to digital unbundled loop services with loops protected by carbon blocks may be subjected to voltages up to these levels. Unexposed COs may not have primary protection, and OTC equipment not co-ordinating with carbon blocks may need protection in these locations.

5.15 If the subscriber loop facility is exposed to commercial ac power, the CO protector may also include 350 mA heat coils for limiting the current that is permitted to flow to CO equipment. In addition, a protective fuse cable located outside the CO incorporating 24 or 26 AWG conductors to coordinate with the protector, serves to limit current to safe levels in the event of prolonged operation of the protector during power fault conditions.

B. OTC Equipment CO Cabling Requirements

5.16 The CO cabling used to terminate OTC equipment on the CODF shall use twisted-pair conductors.

5.17 The type, gauge, and length of the OTC CODF cabling shall be specified based on this specification and OTC equipment requirements. If the specifications in this document differ from the OTC equipment manufacturers specifications, then the more stringent of the two shall be used.

5.18 The direct-current resistance of the CO cabling between the OTC equipment and the CODF shall meet the CO cabling requirements in the Bellcore FR-TSY-000064 [15] (i.e., 23 ohms or less). This is equivalent to 275 feet or less of 26 gauge cable, 440 feet or less of 24 gauge cable, and 700 feet or less of 22 gauge cable.

5.19 All CO cabling between OTC equipment and the CODF shall be connected as specified by the BA CO Engineer.

5.20 The 1kHz loss of the CO cabling between the OTC equipment and the CODF, when measured between 900 ohm impedances, shall be less than .15 dB.

5.21 The C-message noise measured on the CO cabling between the OTC equipment and the CODF shall be 20 dBrnC or less.

C. OTC DSX-1 Cabling Requirements

5.22 OTC DSX-1 cabling and build-out in each direction of transmission shall be the equivalent of 655 feet of 22 gauge ABAM cable.

6. References

A. Definitions

Asymmetrical Digital Subscriber Line (ADSL)
A system that is capable of transmitting digital signals up to 6 Mbps toward the EU-POT and up to 640 kbps from the EU-POT.

ADSL Unbundled Loop Service (ADULS)
A service that provides an effective 2-wire channel, suitable for the transport of ADSL, between the Bell Atlantic central office distributing frame termination of collocated equipment belonging to an OTC and the rate demarcation point at a customer location. Two types of ADULS channels are offered: ADULS-R (up to 18 kft) and ADULS-C (up to 12 kft).

Basic Rate Integrated Services Digital Network Interface (BRI)
The BRI is a 2-wire ISDN interface that uses the two-binary one-quaternary line code at a 160 kilobit per second rate to transport overhead and up to two B channels and one D channel.

B Channel
The B channel is a 64 kilobit per second channel used for information transfer between users.

Bit
An abbreviation for binary digit; one of the members of a set of two in the binary numeration system, e.g., either or the digits 0 or 1. Also, a unit of information; one bit of information is sufficient to specify one of two equal and likely possibilities, usually meaning *yes* or *no*.

Bridged tap
Any branch section of a cable pair, or any extension of a cable pair beyond the point where it is used, in which no direct current flows when customer equipment is connected and used.

Carrierless AM/PM (CAP)
An ADSL line code technique that maps serial bits into phase and quadrature symbols and uses a filter to provide passband spectral shaping.

Carrier Serving Area (CSA) Design
Loop distribution design guidelines developed for wire extensions from Digital Loop Carrier Remote Terminals to customer premises. CSA design criteria allows up to 12 kft of 24 gauge cable less any bridged tap, or up to 9kft of 26 gauge cable less any bridged tap. Bridged tap is limited to 2.5 kft.

Central Office (CO)
A telephone company building which houses equipment and facilities used to provide switched access services.

Central Office Distributing Frame (CODF)
Framework located in a CO that holds wire cross-connects which are used to interconnect cable terminations for EU customer loops, switching system ports, and inter-office facilities.

Channel
An electrical, or photonic communications path between two or more points of transmission.

C-Message Noise
The frequency-weighted, short-term average noise within an idle channel. The frequency weighting, called C-message, is used to account for the variations in 500-type telephone set transducer efficiency and EU annoyance to tones as a function of frequency.

dBm
A unit for expression of power level in decibels relative to one milliwatt.

dBrn
A unit used to express noise power in decibels relative to one picowatt (-90 dBm).

dBm0
A unit used to express power level in decibels relative to one milliwatt referred to, or measured at, a zero transmission level point (0TLP). A unit used to express noise power in decibels relative to one picowatt measured with C-message weighting.

dBrnC0
Noise power in dBrnC referred to, or measured at, a zero transmission level point (0TLP).

D Channel
The D Channel is a 16 kilobit per second packet-switched channel that carries signaling and control for the B channels and also supports customer packet data traffic at speeds up to 9.6 kilobits per second.

Decibel (dB)
The logarithmic unit of signal power ratio most commonly used in telephony. It is used to express the relationship between two signal powers, usually between two acoustic, electric, or optical signals; it is equal to ten times the common logarithm of the ratio of the two signal powers.

Digital Data Service (DDS)
A service that permits the transmission of synchronous data, in a digital form, in both directions simultaneously (full duplex) at 64 kbps and subrates.

DDS Unbundled Loop Service (DDSULS)
A service that provides a 4-wire channel, suitable for the transport of Digital Data Service signals at 56 or 64 kbps between the Bell Atlantic central office distributing frame termination of collocated equipment belonging to an OTC and the rate demarcation point at a customer location.

Digital Signal Level One (DS1)
A digital signal transmitted at the nominal rate of 1.544 Mbit/s.

Discrete Multitone (DMT)
An ADSL line code that is a version of multi-carrier modulation that allows allocation of physical payload data bits and perhaps transmitter power among many subchannels depending on the loss and interference encountered.

Drop wire
The last portion of many subscriber loops that connects the distribution cable to the customer premises. The most common aerial drop wire (F-type) has parallel 18 ½ gauge steel conductors that are not twisted. Drop wires are usually less than 700 feet and less than 25 ohms.

Digital Signal Cross-Connect Level One (DSX-1)
A mechanical DS1 cross-connect frame where +/- 3 volt bipolar AMI signals are interconnected.

Facilities
Any cable, poles, conduit, microwave, or carrier equipment, central office distributing frames, central office switching equipment, computers (both hardware and software), business machines, etc., utilized to provide the services offered by a telephone company.

High-Bit-Rate Digital Subscriber Line (HDSL)
A system that is capable of transmitting bi-directional DS1 (1.544 Mbps) signals or bi-directional half DS1 (768 kbps) signals over metallic twisted-pair cables to provide access to digital telecommunications services.

HDSL Unbundled Loop Service (HDULS)
A service that provides a 2-wire or 4-wire metallic channel, suitable for the transport of HDSL, between the Bell Atlantic central office distributing frame termination of collocated equipment belonging to an OTC and the rate demarcation point at a customer location.

Insulation Resistance

The resistance between the tip and ring conductors of an insulated metallic pair or the resistance between each conductor and ground. Also known as leakage.

Integrated Services Digital Network (ISDN)
ISDN describes the end-to-end digital telecommunications network architecture which provides for the simultaneous access, transmission , and switching of voice, data, and image services. These functions are provided via channelized transport facilities over a limited number of standard user-network interfaces.

ISDN Basic Rate Unbundled Loop Service (IBRULS)
An unbundled loop service that provides an ISDN basic rate channel between the Bell Atlantic central office distributing frame termination of collocated equipment belonging to an OTC and the rate demarcation point at a customer location.

Loop
A transmission channel between a EU customer location and a BA CO that is used as a transmission channel for telephone company services.

Other Telephone Company (OTC)
An organization that provides telecommunications services to the public.

Plain Ordinary Telephone Service (POTS)
The basic single line switched access service offered by local exchange carriers to residential and business customers. POTS uses loop-start signaling.

Power Influence (PI)
The power of a longitudinal signal induced in a metallic loop by an electromagnetic field emanating from a conductor or conductors of a power system. PI is also called longitudinal noise or noise-to-ground.

Rate Demarcation Point (RDP)
The point at which Bell Atlantic network access recurring charges and responsibility stop and beyond which customer responsibility begins. The RDP is the point of demarcation and/or interconnection between a Bell Atlantic subscriber loop facility and EU premises cabling or terminal equipment. Bell Atlantic facilities at, or constituting, the rate demarcation point shall consist of wire or a connector conforming to Subpart F of Part 68 of FCC rules.

Revised Resistance Design (RRD)
Loop design guidelines used after 1986. RRD design criteria allows up to 1300 ohms of non-loaded cable. Non-loaded cable is further limited in length to 18 kft. The total length of all bridged tap should not exceed 6 kft. The total length of all non-loaded cable plus the length of all bridged tap should not exceed 18 kft. Loaded bridged tap is not permitted.

Secondary Channel
A capability that offers the customer a companion digital transmission channel independent of the Primary Channel at a lower bit rate than the Primary Channel.

Synchronous Transmission
Transmission that has three levels of synchronization: bit, character, and message. Bit synchronization refers to the need for the transmitter and receiver to operate at the same rate. Other levels of synchronization refer to the need for the transmitter and receiver to achieve proper phase alignment, so that the beginning and end of a character, message, time slot, or frame can be readily, identified for information retrieval.

Transmission Enhancement Equipment
In general, any equipment that improves the characteristics of a transmitted signal. In this document, transmission enhancement equipment is any equipment that regenerates a digital signal.

Unbundled Loop
A transmission channel between a EU customer location and a LEC CO that is not a part of, or connected to, other LEC services.

Voice Grade (VG)
A term used to describe a channel, circuit, facility, or service that is suitable for the transmission of speech, digital or analog data, or facsimile, generally with a frequency range of about 300 to 3000 Hz.

B. Acronyms

ADSL	Asymmetrical Digital Subscriber Line
ADULS	ADSL Unbundled Loop Service
ADULS-R	ADSL Unbundled Loop Service - Type 1
ADULS-C	ADSL Unbundled Loop Service - Type 3
AL	Acceptance Limit
AMI	Alternate Mark Inversion

ANSI	American National Standards Institute
BA	Bell Atlantic
BER	Bit Error Ratio
BRI	Basic Rate ISDN
BRITE	Basic Rate ISDN Terminal Equipment
B8ZS	Bit Eight Zero Suppression
CPE	Customer Premises Equipment
CAP	Carrierless AM/PM
CO	Central Office
CODF	Central Office Distributing Frame
COT	Central Office Terminal
CSA	Carrier Serving Area
DDS	Digital Data Service
DDSULS	DDS Unbundled Loop Service
DLC	Digital Loop Carrier
DMT	Discrete Multi-Tone
DSX-1	Digital Signal Cross-Connect Level One
DS0	Digital Signal Level Zero
DS1	Digital Signal Level One
DS1ULS	DS1 Unbundled Loop Service
DVM	Data-Voice Multiplexer
EFS	Error-Free Seconds
ESF	Extended Superframe Format
EU	End-User
HDSL	High-Bit-Rate Digital Subscriber Line
HDULS	High-Bit-Rate Digital Unbundled Loop Service
IAL	Immediate Action Limit
IBRULS	ISDN Basic Rate Unbundled Loop Service
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LT	Line Terminating
NC	Network Channel
NCI	Network Channel Interface
NID	Network Interface Device
NT	Network Terminating
OTC	Other Telephone Company
PI	Power Influence
POT	Point of Termination
POTS	Plain Ordinary Telephone Service
RDP	Rate Demarcation Point
RRD	Revised Resistance Design
RT	Remote Terminal
SES	Severely Errored Second
SF	Superframe Format
USOC	Universal Service Order Code
VF	Voice Frequency
VG	Voice Grade
2B1Q	Two-Bit One-Quaternary

7. Bibliography

1- ANSI T1.601-1992, American National Standard for Telecommunications - *ISDN - Basic Access Interface for Use on Metallic Loops for Application at the Network Side of NT, Layer 1 Specification.*[2]

2- ANSI T1.403-1995, American National Standard for Telecommunications - *Network-to-Customer Installation - DS1 Metallic Interface.*[2]

[2] To obtain ANSI documents, contact American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

3- ANSI T1.410-1992, American National Standard for Telecommunications - *Carrier-to-Customer Metallic Interface - Digital Data at 64 kbit/s and Subrates,*

4- Committee T1 - Telecommunications Report No. 28, *A Technical Report on High-Bit-Rate Digital Subscriber Lines (HDSL)*, 1992.

5- ANSI T1.413-1995, American National Standard for Telecommunications - *Network and Customer Installation Interfaces - Asymmetric Digital Subscriber Line (ADSL) Metallic Interface.*[2]

6- ANSI T1.401-1993, American National Standard for Telecommunications - *Interface Between Carriers and Customer Installations - Analog Voicegrade Switched Access Lines Using Loop-Start and Ground-Start Signaling.*

7- Special Report SR-TSV-002275, Issue 2, *BOC Notes on the LEC Networks - 1994.* Bellcore; 1994.[3]

8- ANSI/IEEE 743-1995, *Standard Methods and Equipment for Measuring the Transmission Characteristics of Analog Voice Frequency Circuits.*[2]

9- Special Report SR-STS-000307, *NC/NCI Code Dictionary,* Issue 6, Bellcore, May 1995.[3]

10- Special Report SR-STS-000323, *NC/NCI Compatibility Guide,* Issue 4, Bellcore, May 1994.[3]

11- ANSI T1.102-1993, American National Standard for Telecommunications - *Digital Hierarchy - Electrical Interfaces,.*[2]

12- Bell Atlantic Network Services Reference Manual Series 72710 & NS6050.

13- Generic Requirements GR-63-CORE, *Network Equipment-Building System (NEBS) Requirements: Physical Protection*, Issue 1, Bellcore, December 1995.[3]

14- Generic Requirements GR-1089-CORE, *Electromagnetic Compatibility and Electrical Safety - Generic Criteria for Network Telecommunications Equipment*, Issue 1 Bellcore, December 1994.[3]

15- Technical Reference FR-NWT-000064, *LATA Switching Systems Generic Requirements* (LSSGR), Bellcore, 1994.[3]

NOTE: These documents are subject to change. References reflect the most current information available at the time of printing. Readers are advised to check the status and availability of all documents.

[3] To obtain Bellcore documents, contact Bellcore Customer Service, 8 Corporate Place - PYA 3A-184, Piscataway, NJ 08854-4156. In the US and Canada, call 1-800-521-CORE. All others call 908-699-5800.

INTRODUCTION

On April 11, 1997, Network Access Solutions (NAS) and Bell Atlantic-Virginia, Inc. (BA) entered into an Interconnection Agreement. Section 3.2.10 of this Interconnection Agreement stated "Upon request by either BA or NAS, the Parties shall agree upon a reasonable schedule and location for a technical and operational trial (s) of ADSL 2-Wire, HDSL 2-Wire and/or HDSL 4-Wire" Unbundled Local Loops (ULLs). Pursuant to this agreement, on May 6, 1997, NAS requested a technical and operational trial for these services. Unbundled ISDN-BRI and DS-1 loops were also requested in addition to the related DS1 transport.

The first meeting between NAS and BA was held on May 20, 1997. At this meeting it was agreed that the network established during this trial would be utilized by NAS for data traffic only and that the trial would be conducted in the Herndon Wire Center.

The trial was originally scheduled to last approximately three months, starting when the first unbundled loop was activated for service. After resolution of collocation and NEBS compliance issues, the trial officially began on April 10, 1998. In order for NAS and BA to capture additional information regarding mechanized ordering, trouble insertion and trouble resolution the trial was extended through the end of September, 1998.

This report provides the results of the cooperative, technical and operational trial conducted between NAS and BA.

OBJECTIVES

The primary objective of this trial was to identify and develop the administrative, operational and technical capabilities and procedures associated with provisioning unbundled xDSL loops while establishing a better understanding between NAS and BA relative to these technologies.

NAS' Objectives

- To test their use of a data access network, for data traffic only, to assess the best technology to serve their end users based upon the existing loop.
- Facilitate an understanding of BA procedures and interfaces relative to ordering, provisioning and maintaining xDSL Unbundled Loop Services
- Utilize the Collocation Process
- Order at least one of each of the following unbundled loop types:
    * 2 Wire ADSL
    * 2 Wire HDSL
    * 4 Wire HDSL
    * DS-1

    * ISDN-BRI
- Order and utilize DS-1 Transport
- Develop technical and logistical data for wide spread deployment

Bell Atlantic's Objectives

- Utilize existing processes and procedures to provide the requested unbundled xDSL loops wherever possible
- Develop new processes and procedures where required
- Develop and test loop qualification and loop conditioning processes associated with unbundled xDSL loop requests
- Address flow through provisioning, testing, and trouble insertion issues and processes
- Address spectrum compatibility issues

PRELIMINARY SET UP:

Pre-Qualification of Selected Loops in Two Wire Centers

NAS initially selected two Central Offices, Herndon and Sterling, for the trial. Bell Atlantic's Product Line Management suggested that we confine the trial to one central office and NAS agreed. NAS provided a selection of loops from each of their initial C.O. choices to aid in determining which C.O. should be used for the trial.

The loop characteristics were reviewed for each of the end user locations provided by NAS. These loops were for a NAS location and/or their employees' residences. A manual record verification process was used to determine the characteristics of the loops. Binder group qualification was not done on these loops because a qualification process was not in place for spectrum management. NAS as well as Bell Atlantic was concerned about Loop Qualification procedures. Neither NAS nor Bell Atlantic desired a process that would require people at both ends of the loop for qualification due to costs. As such, only loop make-ups were done.

Bell Atlantic's New Services Technology Organization stated that there are additional cable lengths, not reflected in the loop makeup information. The loop makeup provides the distances from the cable vault to the cable terminal serving the customer premises. Cable and wiring within the central office could add approximately 85 to 1600 feet to the distances. (In Herndon or Sterling the additional CO cabling distance should be close to the minimum.) Additionally, the drop wire between the cable terminal and the NID or RDP could add another 0 to 25Ω resistance. The following results were obtained from a review of the location loops:

Herndon	400 Herndon Pkwy	Slightly over CSA formula; OK for ADSL 1.5Mb/s or BRIULS
	11419 Sunset Hills	Has DLC; No Plugs available for ADSL or HDSL
	950 Herndon Pkwy	Meets CSA objectives; All services can be provisioned
	100 Carpenter Dr.	Has DLC; No Plugs available for ADSL or HDSL
	105 Carpenter Dr.	Has DLC; No Plugs available for ADSL or HDSL
Sterling	52 Rutherford Cr.	Disqualified; Loop is too long - Cannot be conditioned
	46587 Riverwood	Meets CSA objectives
	20640 Muddy Har.	Has DLC; No Plugs available for ADSL or HDSL
	21515 Ridge Top Cr.	Disqualified due to load coil and Bridged Tap If load coil can be removed, the loop would meet RRD guidelines for ADSL 1.5 Mb/s or BRIULS If BT & load coil were removed, loop would meet CSA guidelines

Selected Site for Collocation:

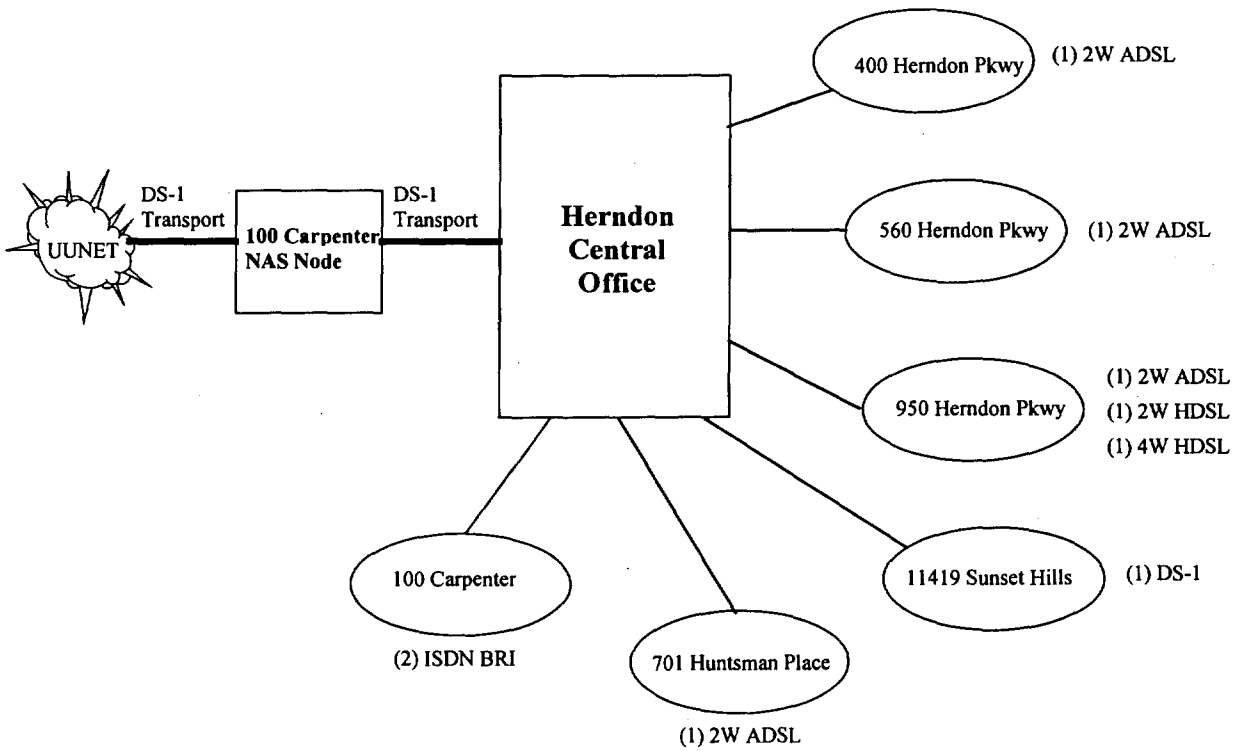
Based upon the above information, Herndon was selected for collocation during the trial. Its loops had the most promising characteristics of the two C.O.s for NAS's and BA's purposes.

As a result of the loop verifications, and subsequent investigation, the unbundled loop requirements placed at trial initiation included:.

Herndon	400 Herndon Pkwy	(1) 2W ADSL
	560 Herndon Pkwy	(1) 2W ADSL
	11419 Sunset Hills	(1) DS1
	950 Herndon Pkwy	(1) 2W ADSL; (1) 2W HDSL; (1) 4W HDSL
	100 Carpenter Dr	(2) ISDN BRI
	701 Huntsman Place	(1) 2W ADSL

Additionally, some DS-1 Transport was required from the Herndon C.O. to NAS's node at 100 Carpenter St. and from there to UUNET. The following sketch reflects the selected site for the initial trial set-up along with selected unbundled loop types:

NETWORK ACCESS SOLUTIONS
UNBUNDLING REQUIREMENTS



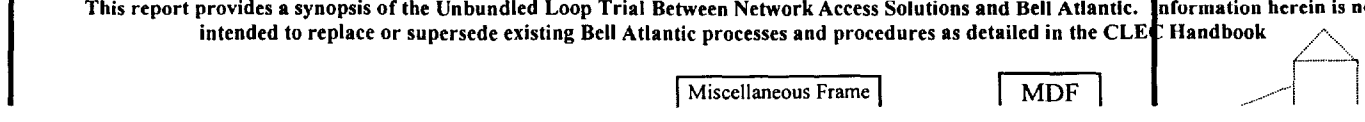
Establishing Collocation:

For the Unbundled ADSL Loop Trial with Bell Atlantic, NAS ordered temporary Collocation Space in the Herndon Central Office and transport to connect their collocated equipment in the Herndon Central Office to their NODE at 100 Carpenter St. Additionally, they ordered transport to connect their NODE at Carpenter Street to UUNET, an Internet service. (See previous sketch)

NAS issued an ASR (Access Service Request) for a DS-1 from the telephone room at Carpenter Street to their Collocated Equipment in the Herndon C.O. They also issued an ASR for the DS-1 from the telephone room at Carpenter Street to UUNET.

The Collocation arrangement used for the trial was a simulated Physical Arrangement placed in a Virtual Setting. This was required because there was no Physical Collocation Space available in Herndon. This arrangement was provided so that NAS could acquire a feel for the process of Physical Collocation, which it intends to use wherever possible. The collocation site was installed with the types of interfaces that are required in a physical arrangement, but are being done in Bell Atlantic's Space, without the construction of a physical Vendor Cage or Common Collocation Area. (See Following Sketch) This site will be removed/disassembled at the completion of the trial.

Herndon Central Office



A Miscellaneous Frame was ordered and built to emulate the Common Area interface. This frame was installed by BA and included 2 wire, 4 wire, and DS-1 interfaces cabled to the Main Distribution Frame (MDF) or the MDXS1 as appropriate. As required, each 4 wire loop assignment had its own Equivalent Port Assignment (EPA) Number, as well as each of the 2 wire loops.

For purposes of the trial, AC power was used for the NAS equipment. Bell Atlantic provided a 120 Volt, 20 Amp outlet near the Miscellaneous Frame for use by NAS to power their equipment.

Bell Atlantic provided a schedule that is based on Virtual Collocation. The activities that noted on the schedule were as follows:

- Application Received
- LCC Requests TEO
- Site Survey
- TEO Issued
- Establish Contact Names

- Bell Atlantic Equipment Installation Start
- Bell Atlantic Equipment Installation Complete
- E1 Inventory Complete
- TIRKS Complete
- FOMS/COSMOS Complete
- Ready For Service

NAS's installation of its equipment took place after the Bell Atlantic Equipment Installation completed.

NAS had their equipment brought into the area near the Miscellaneous Frame and wired to the interfaces as required. (This simulated equipment installation in a physical arrangement.) NAS provided its own DC power supply used to provide the DC voltages to their equipment. This power supply plugged into the 120 Volt circuit provided in the Miscellaneous Frame. NAS provided their equipment mounted in a bay.

Although all NAS's equipment was installed, cabled and powered, the Bay Network 5000 unit was extending beyond the relay rack into the aisle by approximately 13 to 15 inches. Bell Atlantic's Vendor Management group determined that to be a safety hazard which had to be rectified.

Through the combined efforts of the Bell Atlantic & NAS trial team, it was suggested that the equipment be centered in the framework thereby reducing the protrusion in the aisle. BA's Vendor Management decided that the centering option would be acceptable for the duration of the trial. It was noted however that for permanent installations, different arrangements would have to be made.

PHASE I:

Ordering Facilities

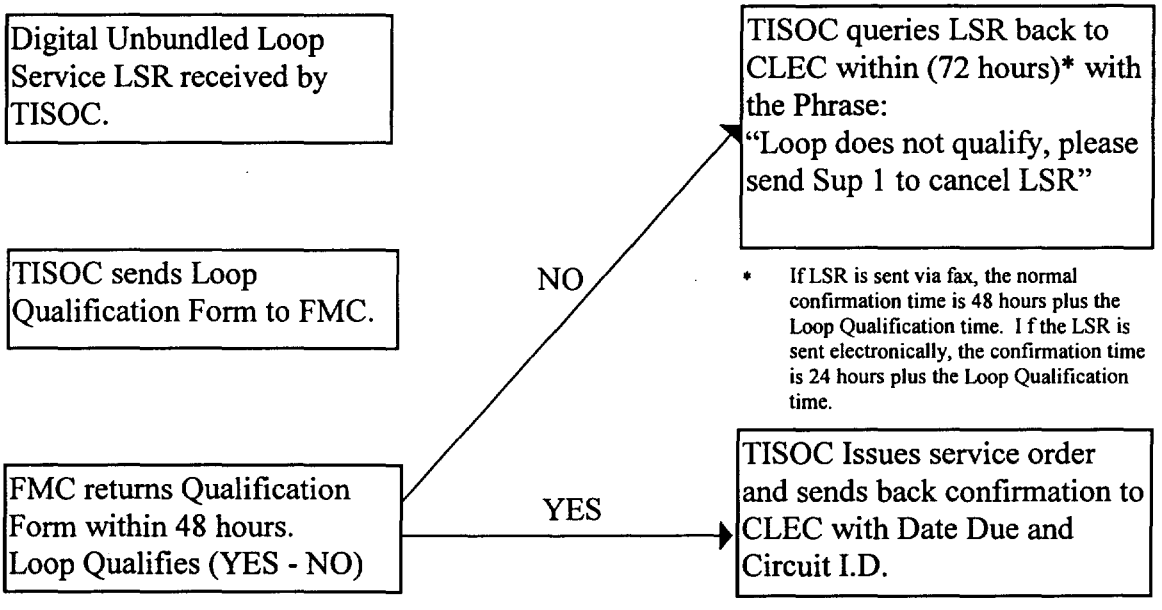
Bell Atlantic's Account Manager for NAS reviewed, with NAS, the ASR (Access Service Request) process. Subsequent to the Collocation Installation, NAS submitted ASRs to connect their Carpenter St. Node to UUNET and to their equipment in the Herndon Central Office.

Ordering Unbundled Loops

NAS issued LSRs (Local Service Requests) for Unbundled elements (loops) to the TISOC (Telcom Industry Services Operations Center). The LSR is an OBF (Ordering & Billing Forum) form, the documentation of which is National in scope and which is developed by the OBF. NAS obtained a copy of the documentation pertaining to filling out LSRs. Additionally, Bell Atlantic's TISOC organization met with NAS to review the LSR process.

The Phase I Unbundled Loops that were ordered by NAS and provided by BA in the trial included (4) ADSL Loops, (2) ISDN BRI Loops, (1) 2W HDSL Loop, (1) 4W HDSL Loop, and (1) DS-1 Loop to six different end user locations.

The Unbundled Loops in this phase of the test were manually pre-qualified, with the end user locations known by Bell Atlantic prior to NAS's submittal of orders. The TISOC Organization provided the following high level overview of a process, for purposes of this trial, used in the TISOC Unbundled Loop Service Qualification. Please note that times may vary from actual implementation.



This process was used strictly for the trial and to set up procedures to be used for manually qualifying a loop once xDSL is deployed by BA. Several steps in this process have been refined as methods and procedures have been developed.

Installing Unbundled Loops

For purposes of the trial, all Unbundled loops were considered new services. Once the TISOC organization received the LSR for an Unbundled loop, and was notified that it qualified, the TISOC issued a service order to the RCCC (Regional CLEC Control Center), where the process for Loop Installation starts.

The Phase I Loop installation process was a "hand held" process because of the new nature of the Unbundled ADSL Loops. The process, for the most part, follows the normal provisioning for the RCCC Flow for New Services as provided here:

1. Order is received in RCCC
    - Coordinator notifies Dispatch and Central Offices of pending work. Arrangements are made for service to be connected on day before Date Due unless jeopardy situation occurs.
        - If there is a problem on Bell Atlantic side which causes jeopardy situation, CLEC is notified by RCCC
2. On plant test date DD-1
    - The technician will
        - Tag loop with circuit ID
        - Install NID
        - Check test results
    - The RCCC coordinator will verify with technician and document
        - Test results
        - Type of NID
        - DMARC location
    - The RCCC coordinator will
        - Save in system, all documented information received from technician
        - Contact CLEC with information about the NID and DMARC location
3. On DD the order is completed

    - NOTE: IF THE CLEC SHOULD HAVE TO CHANGE THE DD, THE TISOC MUST BE NOTIFIED
    - NOTE: IF JEOPARDY SITUATION OCCURS ON BELL ATLANTIC SIDE, THE CLEC WILL BE NOTIFIED BY THE RCCC
    - NOTE: ON NEW SERVICE, TECHNICIAN DISPATCHES ARE NOT COORDINATED

Loop Testing

Once the loops were installed, they were turned over to NAS. NAS installed their customer premise equipment and turned up their service to the end users. Not all loops were turned up for service by NAS immediately for various circumstances as follows:

100 Carpenter	2 - ISDN	Complete 4-3-98
701 Huntsman	1 - ADSL	Waiting for end user to install electric
560 Herndon	1 - ADSL	Complete 4-3-98
11419 Sunset Hills	1 - DS1	Complete 4-14-98
950 Herndon	1 - 2W HDSL	Complete 4-10-98
	1 - 4W HDSL	Pending customer completion
	1 - ADSL	Pending customer completion
400 Herndon	1 - ADSL	Need end user access

Trouble Insertion

The Phase I trouble insertion process was intended to show what various test centers in Bell Atlantic as well as NAS would see when a specific trouble was placed on a line. In order to accomplish this, Bell Atlantic and NAS first developed a list of possible troubles that might occur and which could be inserted into a circuit either at the end user site, in the outside plant, or in the central office. Following is the list of those troubles:

Loop Tests:

1. High resistance short
2. Cross tip to ring.
3. Low resistance short
4. Open tip and ring.
5. Short/cross with ground both sides.
6. FEMF (DC) both sides, with high resistance short/cross.
7. Tip and Ring Reversal.
8. Add Bridge Tap
9. Add Load Coil
10. BA initiated Cable Pair moves.
11. High Resistance with Open

CO Fault Insertion -Common:

1. Open Detent.
2. Grounded Detent (tip, ring)
3. Defective T-1 Conn. in BA Office.
4. Defective X conn between MDF and ADSL Equipment.
5. Equipment Reconfigurations
6. Defective ADSL Port Unit.
7. Incorrect Options or wrong plug type in ADSL Port.
8. Missing ADSL Port Unit.

Spectral Interference:

1. T-1Span
2. HDSL Loop
3. ISDN Loop
4. ADSL Loop

It was determined that not all troubles would be used for this test. In the practical application, various Bell Atlantic and NAS personnel were bridged together to observe what happens as the troubles were inserted. The results of the trouble insertion Phase I for an ADSL Unbundled Loop follows:

Trouble Insertion Summary

36/ARDU/100010/CD

Test: Normal operation

Results:

Remote testing in bridged mode indicates that with no trouble on the circuit, our test system shows a balanced cable pair with ~140-150 uf of capacitance on each conductor. There is no indicator of equipment being attached to the circuit (i.e. high capacitance across the pair or a short). There is no voltage seen and no current flow seen. When the circuit is split toward the CO(NAS) the only change is that the capacitance lowers. This is normal as capacitance is an indication of how much copper is on the circuit. When the circuit is split toward the station, the capacitance lowers slightly from the bridged reading , again an indication how much length is seen.

Test: Solid Short applied to circuit.

Results:

This trouble is seen as a low resistance across the pair. This is the only affected reading.

Test: High Resistance Short(simulates a wet cable pr or phone off hook)

Results:

This caused the test results to show a moderately low resistance across the pair. One way to determine if a short is not solid is to calculate the length of cable. This calculation is based on a solid short. If the same calculation is made using the measured resistance a high resistance short will result in a much longer loop. Resistance is the only affected reading.

Test: Tip Ground, Ring Ground, Tip crossed w/ voltage, Ring crossed w/ voltage.

Results:

These conditions caused results which are to be expected when testing any cable pair. The grounds were seen on there respective conductors. The amount of resistance would give a tester the approximate distance of where the ground was. (Very low resistance to ground would likely be a blown heat coil. Resistance close to that of 1/2 reading of a solid short would likely be a blown fuse at NID.) Voltages were also seen when the respective conductors were crossed w/ battery(i.e. the ring of another pair). Only the condition applied was seen in testing. No other test results were affected. (A grounded tip side only didn't affect the ring side at all.)

Note:

When the circuit is split toward the CO(NAS) the readings will be the same, no matter what the condition of the cable pr is.

Trouble Insertion Phase I did not include the RCMC (Regional CLEC Maintenance Center. The RCMC was included in Phase II Trouble Insertions.

Results / Status

By the conclusion of Phase I of the trial, Bell Atlantic had determined to use the Automated Loop Qualification Process that was already under development for the retail roll out. This would be a long term solution for Unbundled ADSL Loops. This process was still under development, but should provide a solid base for qualifying the Unbundled ADSL Unbundled loops when implemented. For the trial and possibly for the initial roll out of the Unbundled ADSL Loop Product, a manual process was developed and put in place that closely emulated the results of the mechanized process. This Process would be used in Phase II of the trial.

Actual Bell Atlantic processes for ordering and installing the Unbundled ADSL Loop followed the processes for any other unbundled loop product from a TISOC and RCCC perspective. This, with the exception of the Qualification Process in the TISOC and the testing for turn up by the RCCC. (The previous sentence seems incomplete. Is this correct?) Although Loop parameters had been developed and documented in Technical Reference TR 72575, Digital Unbundled Loop Services, the test equipment for the frequencies provided in xDSL services is not commonly available throughout BA. Training and additional equipment will be required.

At this point in the trial, NAS had been provided the opportunity to experience Collocation, Facility ordering through ASRs, and Unbundled Loop Ordering through LSRs. Initial loops provided, worked with NAS's equipment. An overview of several organizations, including the RCCC, RCMC, TISOC, and Collocation had been provided. Additionally, five different loop types were made available for testing by NAS with their services to their end users.

PHASE II:

Ordering Unbundled Loops - Manual Mode:

There were three LSRs issued in the manual mode by NAS for the Phase II portion of the Trial. These were sent via FAX to the TISOC Center. Of the three requests, one loop had Digital Loop Carrier and therefore could not be used for ADSL, one loop was served from a Central Office other than Herndon and therefor couldn't be connected to NAS's equipment, and the final loop was qualified and installed. Below is the Status report prepared by the TISOC center with the disposition of those orders:

NAS Digital Unbundled Loop Service Trial
Phase 2
LSR Status
7/1/98

LSR PON	TYPE OF REQUEST	ADDRESS	CKT ID & ORDER #	DATE DUE	STATUS
NAS 1009	ADSL-R	100 Carpenter Dr. 2nd flr. Sterling Va.			• LSR received on 6-24 at 5:09 p.m. • LSR incorrectly queried on 6-24 at 7:36 p.m. • LSR reassigned on 6-29 at 2:55 pm. • Qualification form sent on

					6-30 at 1:30 p.m. • Qualification form returned on 7-2 4:30 P.M. Loop not qualified. • Query sent on 7-7 1:18 p.m.
NAS 1010	ADSL-R	2201 Cooperative Way 4th flr. Herndon Va.	36.ARDU.100673..CD N1548360	7-14-98	• LSR received on 6-24 at 2:14 pm. • LSR incorrectly queried on 6-24 at 3:07 pm. • LSR reassigned on 6-29 at 2:55 pm. • Qualification form sent on 6-30 at 1:30 p.m. • Qualification form returned on 7-2 4:30 p.m. Loop qualified. • LSC sent on 7-7 1:20 p.m.
NAS 1011	DS1	2455 Horse Pen Rd. 2nd flr. Herndon Va.			• LSR received on 6-24 at 2:45 p.m. • LSR incorrectly queried on 6-24 at 3;07 p.m. • LSR reassigned on 6-29 at 2:55 p.m. • Query sent on 6:30 at 3:36 pm advising NAS that End User address served from Dulles Corners C.O. and ACTL at Herndon C.O.

Installing Unbundled Loops:

Of the three LSRs that were received by Bell Atlantic, only the loop to 2201 Cooperative Way qualified as an Unbundled ADSL Loop and was installed. Installation procedures followed those in place for all other loop installations, with the exception of the testing. At the present time, Bell Atlantic's automated test console equipment does not test for all parameters of the unbundled ADSL loop through the Central Office to the end user location. At this time it is necessary to send a technician to the field, and that technician along with another technician in the C.O. can, with the use of a very limited supply of specialized test sets, test the Unbundled ADSL Loop to the required parameters.

Loop Testing:

******** No Specifics at this time ********

Trouble Insertion:

Trouble insertion for Phase II of the Trial was conducted differently than the Phase I Trouble Insertion. For this phase, troubles were inserted into various circuits at random. NAS's end user would call NAS to report the problem. NAS would segment the trouble. If NAS suspected the trouble to be in the Bell Atlantic Loop, NAS would call the Regional CLEC Maintenance Center. The following job aid was provide to further explain this procedure:

NAS TRIAL

Purpose: To inform our customer of the pertinent information needed to efficiently and timely repair their Bell Atlantic trouble. Also to give our customer a general list of questions they will be asked by a Bell Atlantic's Repair Service Attendant.

All repair calls are to be called into our Regional CLEC Maintenance Center on (1-888-270-1800) The RCMC is available 24 hours. A Repair Service Attendant will take your report. The Repair clerk will ask a series of pertinent questions which are listed below. Also listed is information that is required from the customer to process the trouble report.

After the trouble report has been put into our automated system, the Repair Service Attendant will give the person reporting the trouble a trouble ticket tracking number. Please refer to the trouble ticket number when you call in for status.

Customer will supply the following information:

A. BA Circuit ID
B. Customer Address of the trouble.
C. Customer name reporting the trouble.
D. Customer call back number.
E. Detail of the trouble. (Ex. No Continuity)

The Repair Service Attendant will ask and verify the following questions:

A. Verify the circuit ID
B. Ask for the Bell Atlantic Customer name (Ex. Network Access Solution)
C. Verify the Customer Call back number.
D. Ask for clarification on trouble being reported (If Necessary)
E. Ask the customer if they are authorizing us to dispatch.
F. Ask the customer if we may do testing on the circuit.
G. Ask the customer for access information (Ex. Business hours are 8:00am to 4:30pm
someone will be available to give access between those hours).
H. Verify the address of the trouble that being reported.

In the beginning of this phase, NAS expressed concerns regarding the trouble reporting process. For example, NAS reported two troubles. On one they immediately received a trouble ticket number. On the second order they were told that someone would call them back with a trouble ticket number and

then they did not receive a follow-up call. This seemed to be a training issue in the RCMC that should be rectified in time.

There were also some problems with NAS's getting messages regarding when a Bell Atlantic technician would be dispatched. For purposes in the trial, NAS wanted to be notified when the technician would be dispatched so that they could meet to resolve the problems. Bell Atlantic records state that a message was left with NAS regarding the dispatch information, however, NAS did not get the message.

After a few weeks, NAS reported that the trouble insertion phase of the trial was getting better. Bridgewater improved in their ability to get the Trouble Ticket Numbers to NAS either immediately or on a call back basis, depending on who answers the phone. The trouble reporting times also appeared to be a problem. On one occasion, a trouble report was given on Friday and was pushed to Tuesday. This occurred on a holiday weekend.

In another instance during this phase, NAS did mention that they had a trouble on one of their ADSL lines with intermittent noise. NAS was not sure if this was a BA inserted trouble, the supposition was that it was not an inserted trouble, but in fact was an actual trouble. NAS noted that Bell Atlantic changed out the F1 side of the pair, but the trouble was not resolved. NAS noted that there was still noise on the circuit even when the loop was opened at the test point. NAS did change the port on their equipment to eliminate the possibility of a defect in that piece of equipment. This seemed to be a real puzzler, with the issue being how to test the loop being provided to NAS. Although voice grade testing was done, this didn't accurately test all the parameters of an ADSL Loop nor pick up noise in the frequency range where ADSL works.

A high level overview of the Maintenance Flow process was provided for the Unbundled ADSL Loop Trial. Following is that sketch:

GUI Interface:

During Phase II of Ordering, the TISOC (Telcom Industry Services Operations Center) suggested to NAS that they obtain the GUI Interface. The GUI is a Graphical User Interface Intranet web site that enables unbundlers to interact with Bell Atlantic's internal Operational Support Systems when they send in their service orders. This GUI is accessible through a security server via a dedicated private line or via a security dial up over a public line using a prescribed web browser.

NAS was interested in this and requested that they get the system and then submit additional orders through the GUI. NAS made contact with it's account manager and proceeded in acquiring the system functionality.

Loops Ordered through the GUI:

******** No Specifics at this time ********

GUI Loops Installed:

******** No Specifics at this time ********

GUI Loops Tested:

******** No Specifics at this time ********

Results / Status:

******** No Specifics at this time ********

ACCOMPLISHMENTS

Both companies acquired a better understanding of the issues surrounding the unbundling of xDSL services. The trial was conducted in a cooperative atmosphere between companies, which is essential in this competitive environment.

Below is a list of the most noteworthy accomplishments achieved during this trial:

- Existing procedures for loop ordering were enhanced to include xDSL services
  - New Universal Service Order Codes (USOCs) were established for unbundled ADSL, 2-Wire HDSL and 4-Wire HDSL services
  - New Network Channel/Network Channel Interface (NC/NCI) Codes were established for these services
  - Processes and interfaces were established between the Telecom Industry Services Operations Center (TISOC), the RCCC, and the Facilities Management Center (FMC)
- Preliminary manual loop qualification process was established
  - Existing loop qualification form was updated to include unbundled ADSL and HDSL services
  - Spectrum compatibility analysis was added to the loop qualification process
- Loop Installation
  - Existing procedures between the TISOC and the Regional CLEC Control Center (RCCC) were utilized for the installation of unbundled xDSL loop services
- Loop Maintenance and Repair
  - Utilized existing procedures for reporting troubles to the Regional CLEC Maintenance Center (RCMC) in Bridgewater, NJ.
  - Existing procedures were revised and additional training provided for unbundled xDSL loops

- Provided contacts and generally available documentation for collocation, unbundling, provisioning, and maintenance
    - NAS was provided the documentation associated with the various phases of this trial
- Established and provided the first Unbundled 2-Wire ADSL, 2-Wire HDSL, and 4-Wire HDSL Loops
- Established and provided Unbundled DS-1 and ISDN-BRI Loops
- DS-1 Transport was established

OUTSTANDING ISSUES:

Loop Qualification:

At this point in time the Loop Qualification Process is predominantly manual. Specifics for the internal Bell Atlantic Flow for this process are under development at this time, with expectations that at least three organizations will be involved. Those organizations include the TISOC, the RCCC, and FMC (Facilities Management).

There are major considerations in the qualification of an Unbundled ADSL Loop. The physical properties of the loop that must be considered are loop length restrictions, non-loaded copper only, no Digital Loop Carrier permitted, and limited bridge tap. Additionally, there are spectrum issues that must be taken into consideration. These include services that might be affected by placing ADSL services within a binder group or adjacent binder group of a cable and services that might preclude ADSL from performing properly if placed within the same or adjacent binder group in a cable.

Currently, Bell Atlantic is working to provide automated loop qualification which will decrease some of the manual efforts involved, however qualifying for spectrum compatibility may still require manual intervention.

Loop Testing:

Unbundled ADSL Loops, as all unbundled loops are not connected through a Bell Atlantic Switch. This means that the Mechanized Loop Test system can not access the loops in the normal fashion. In order to provide automated access to the unbundled ADSL Loop, a test point is placed in the circuit that will accommodate accessing the loop from a remote terminal. At this time however, the mechanized Loop Test system can not test all the parameters of an ADSL Loop, especially in the frequencies that the ADSL equipment operates. This system is in the process of being upgraded.

Currently, in order to test a loop for the parameters of ADSL, it is necessary to have a technician in the central office and a technician in the field, each connected to the same loop with specialized test equipment. This of course requires coordination between inside and outside forces. Additionally, the quantity of specialized test sets are limited in various areas.

CONCLUSIONS / SUMMARY:

Bell Atlantic considers this to be a successful trial. The outcome, including the development of practices and procedures among BA work groups involved in provisioning xDSL compatible unbundled loops, as well as those practices and procedures involving our CLECs, leads us to a product offering which helps meet the requirements of opening the network to competition. Bell Atlantic will continue to enhance its product offering as required, as standards need to be met, and as future advancements are made in regards to xDSL.

ADSL standards are not in place today. There are several national organizations charged with developing standards including ADSL technologies as well as Spectrum Management. As these standards are developed and approved, Bell Atlantic will attempt to meet developed standards.